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Jones et al.

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(54) **ELECTRICAL ASSEMBLY**

(71) Applicant: **Lear Corporation**, Southfield, MI (US)

(72) Inventors: **Jeffrey Jones**, Ann Arbor, MI (US); **Raúl Ricart**, Valls (ES); **Antoni Ferré Fàbregas**, Valls (ES)

(73) Assignee: **Lear Corporation**, Southfield, MI (US)

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(51) **Int. Cl.**

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H02B 1/20	(2006.01)
B60N 2/07	(2006.01)
B60N 2/02	(2006.01)

(52) **U.S. Cl.**

CPC ***B60N 2/501*** (2013.01); ***B60N 2/502*** (2013.01); ***H02B 1/20*** (2013.01); *B60N 2/0244* (2013.01); *B60N 2/0715* (2013.01)

(58) **Field of Classification Search**

CPC B60N 2/501; B60N 2/502; B60N 2/0715; B60N 2002/0264; H02B 1/20; H02B 1/22; B60R 16/0315

See application file for complete search history.

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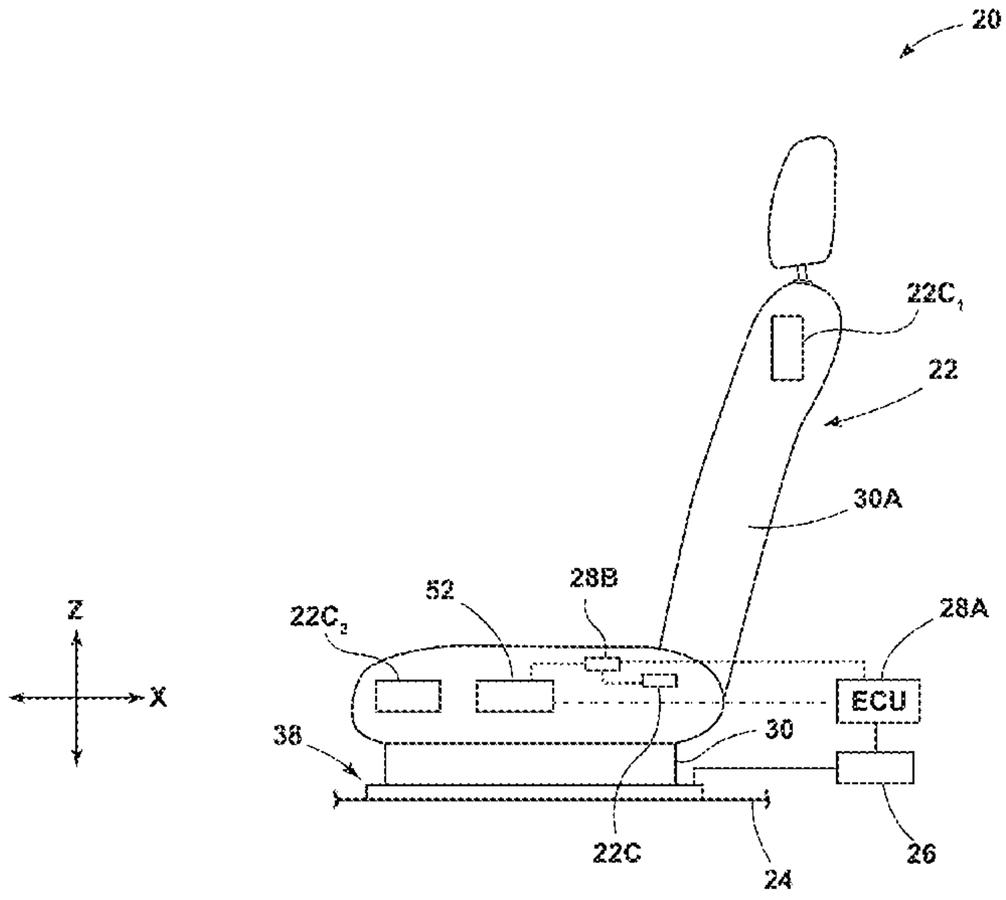
Primary Examiner — Tan Le
(74) *Attorney, Agent, or Firm* — Fishman Stewart PLLC

(57) **ABSTRACT**

An electrical assembly includes a track assembly, a control circuit, and a support assembly. The track assembly may include a first bus bar, and/or the first bus bar may be configured for connection with a first terminal of a power source. The track assembly may include a second track that may have a second bus bar, and/or the second bus bar may be configured for connection with a second terminal of said power source. The support assembly may be configured for connection with the track in a first orientation and/or in a second orientation. The support assembly may include a positive terminal and/or a negative terminal.

20 Claims, 16 Drawing Sheets



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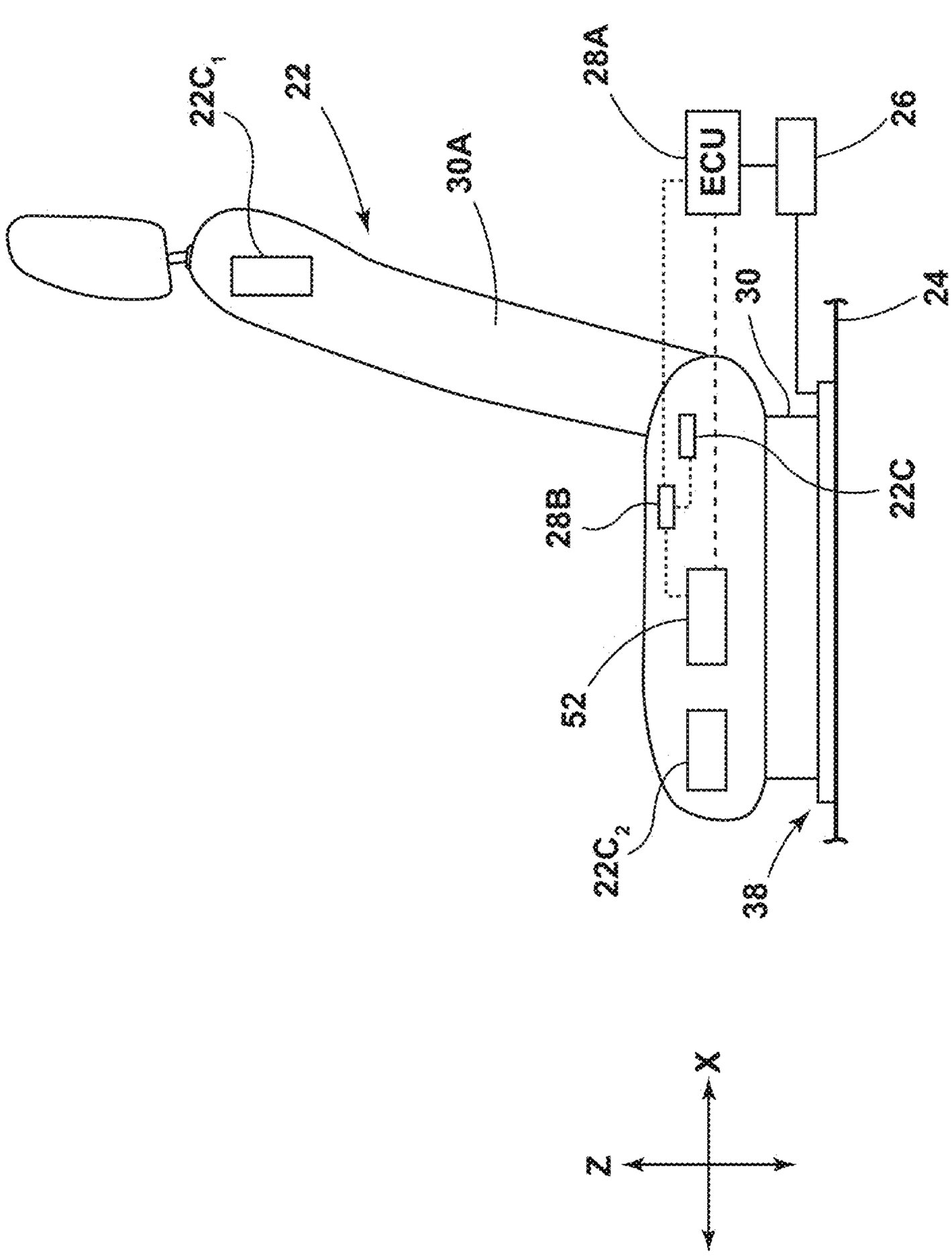

FIG. 1

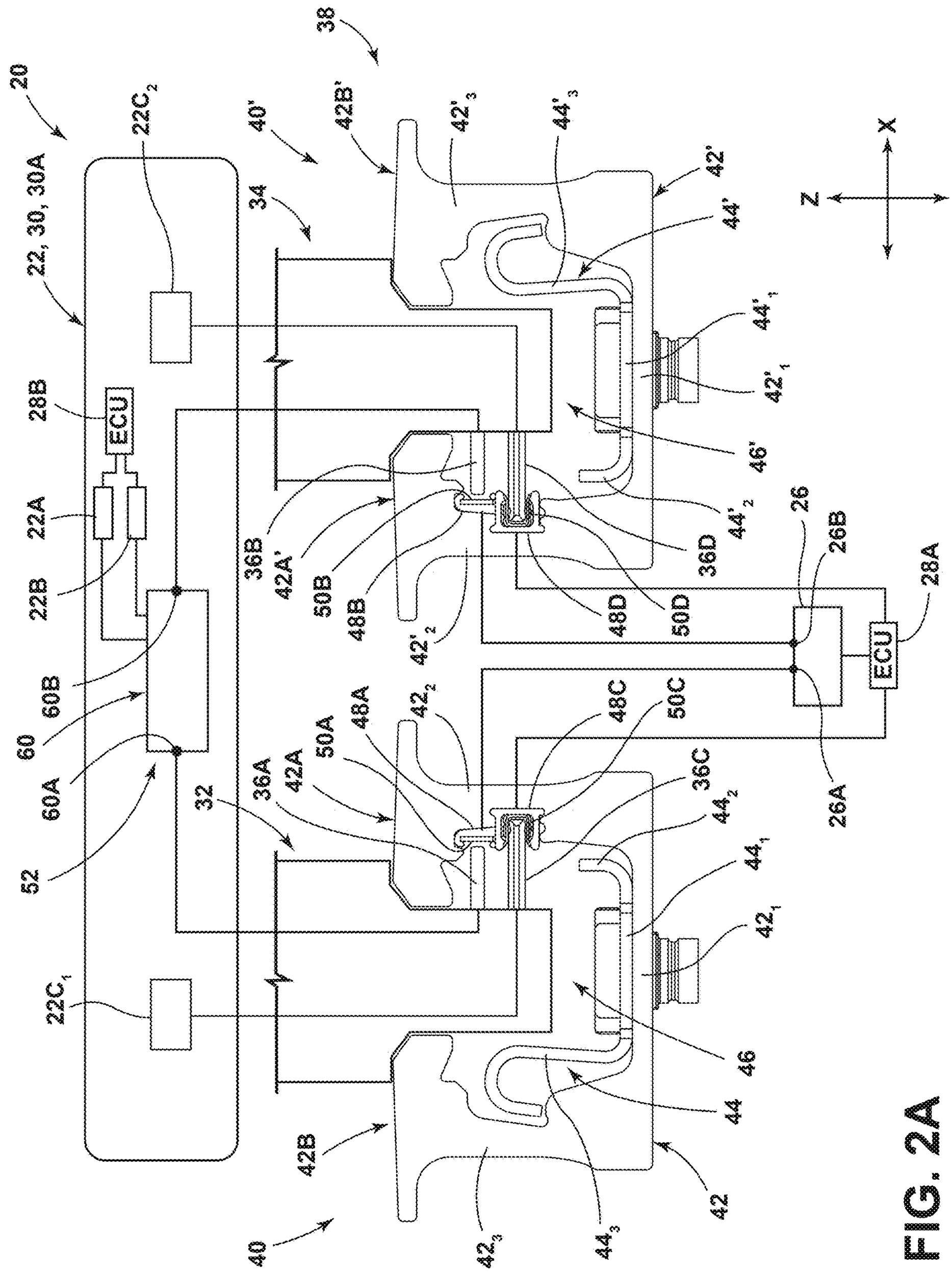
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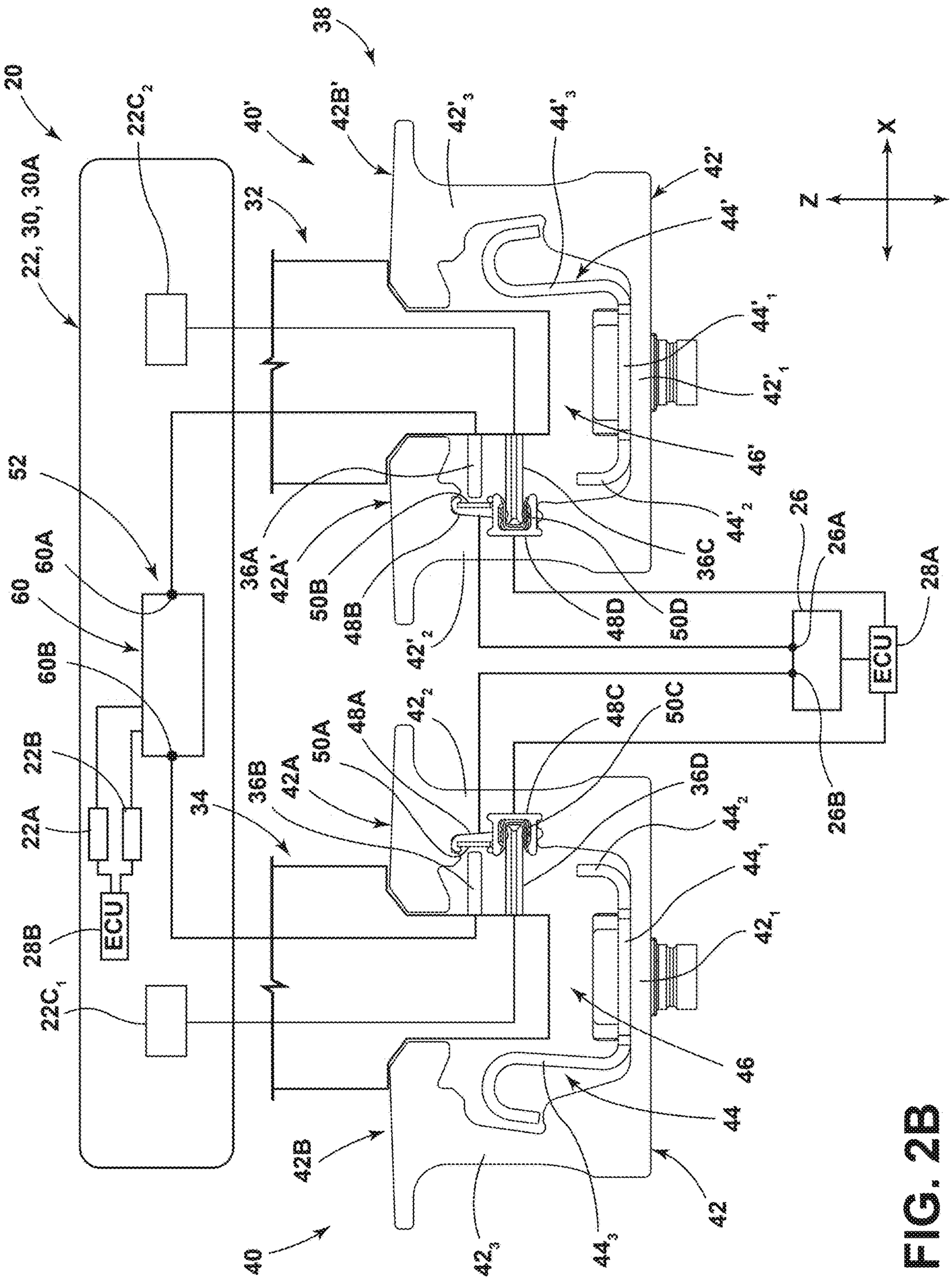
FIG. 2A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36A
42A'
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48D
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50A
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48C
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FIG. 2B

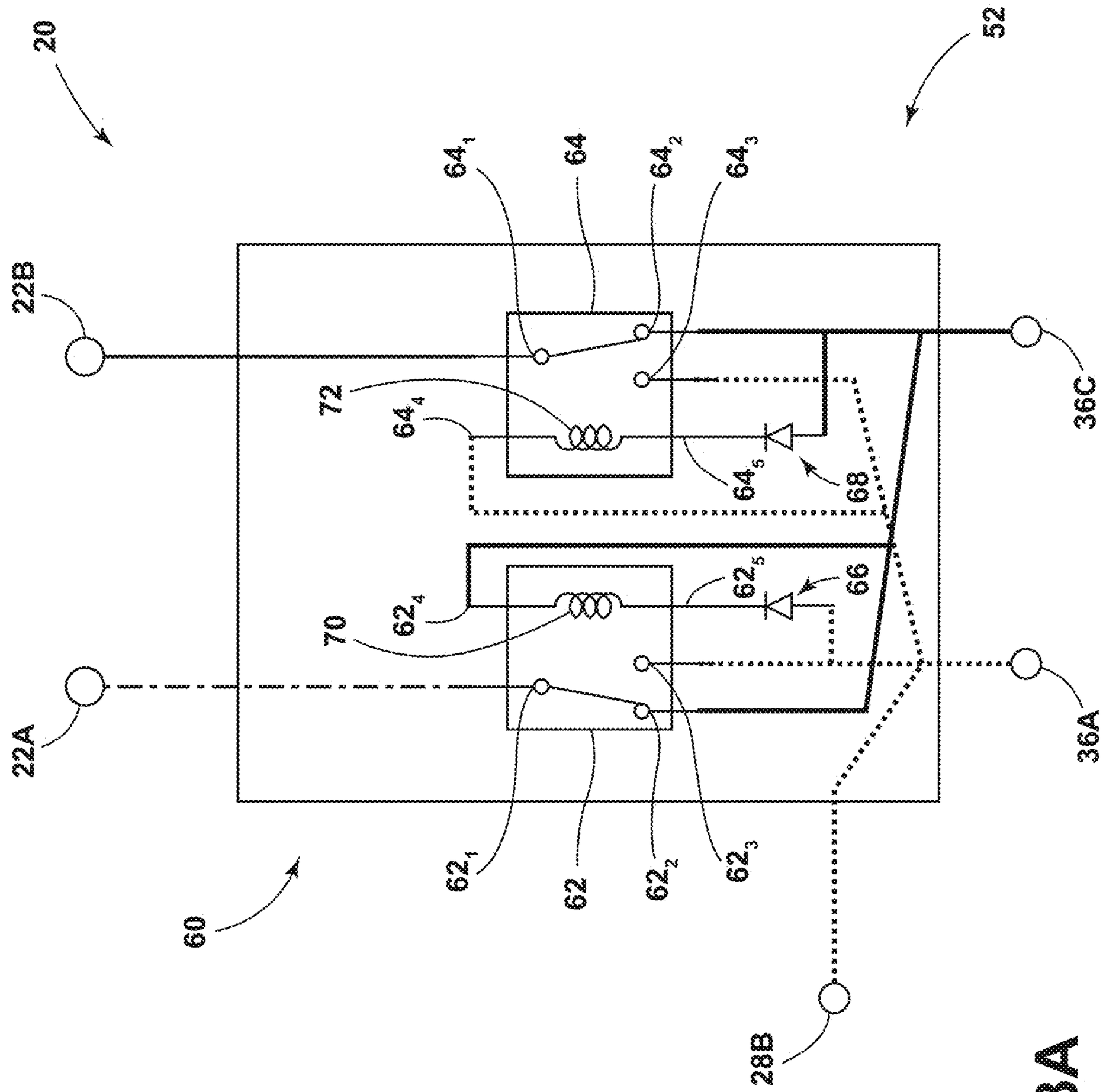
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FIG. 3A

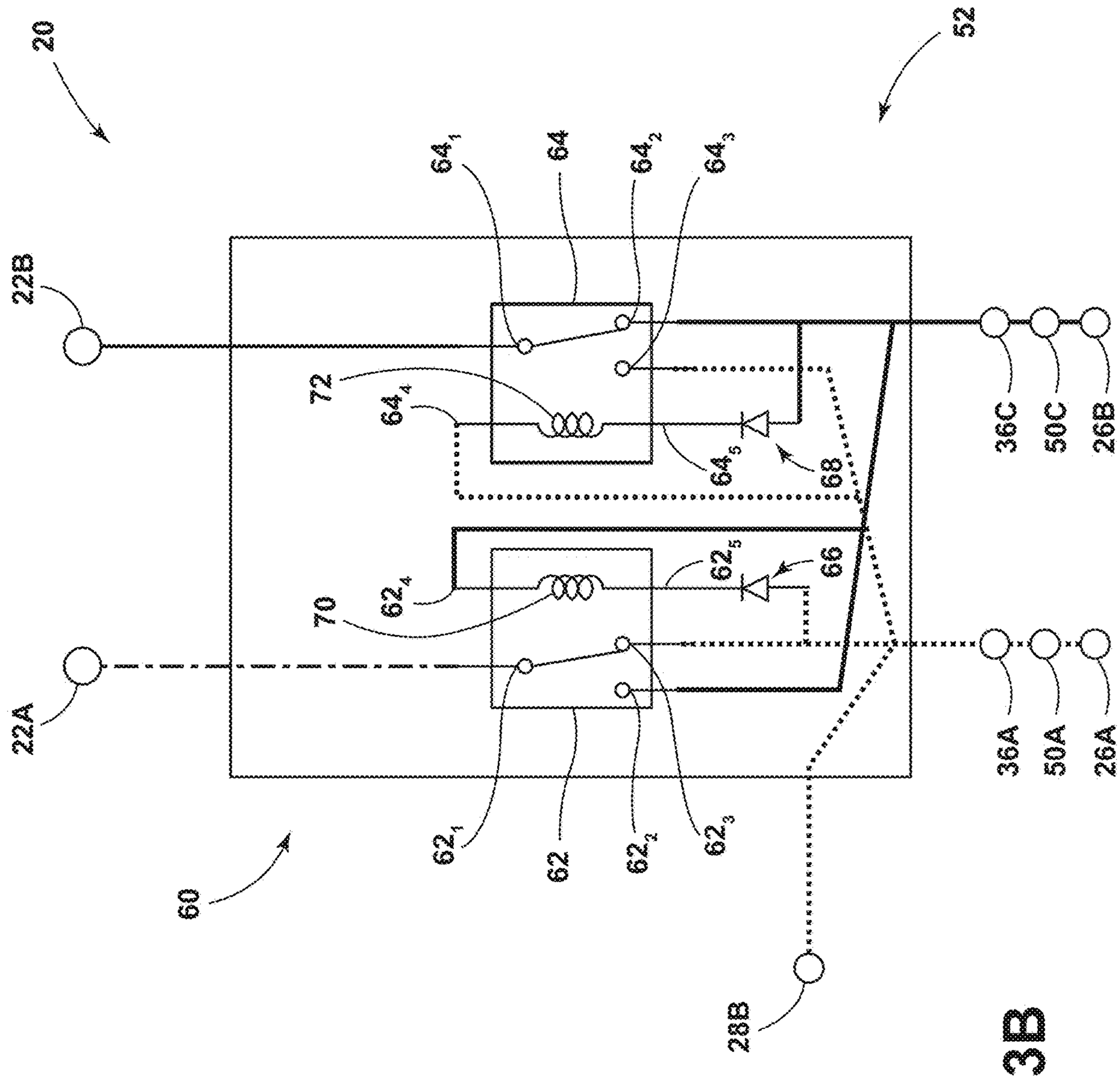
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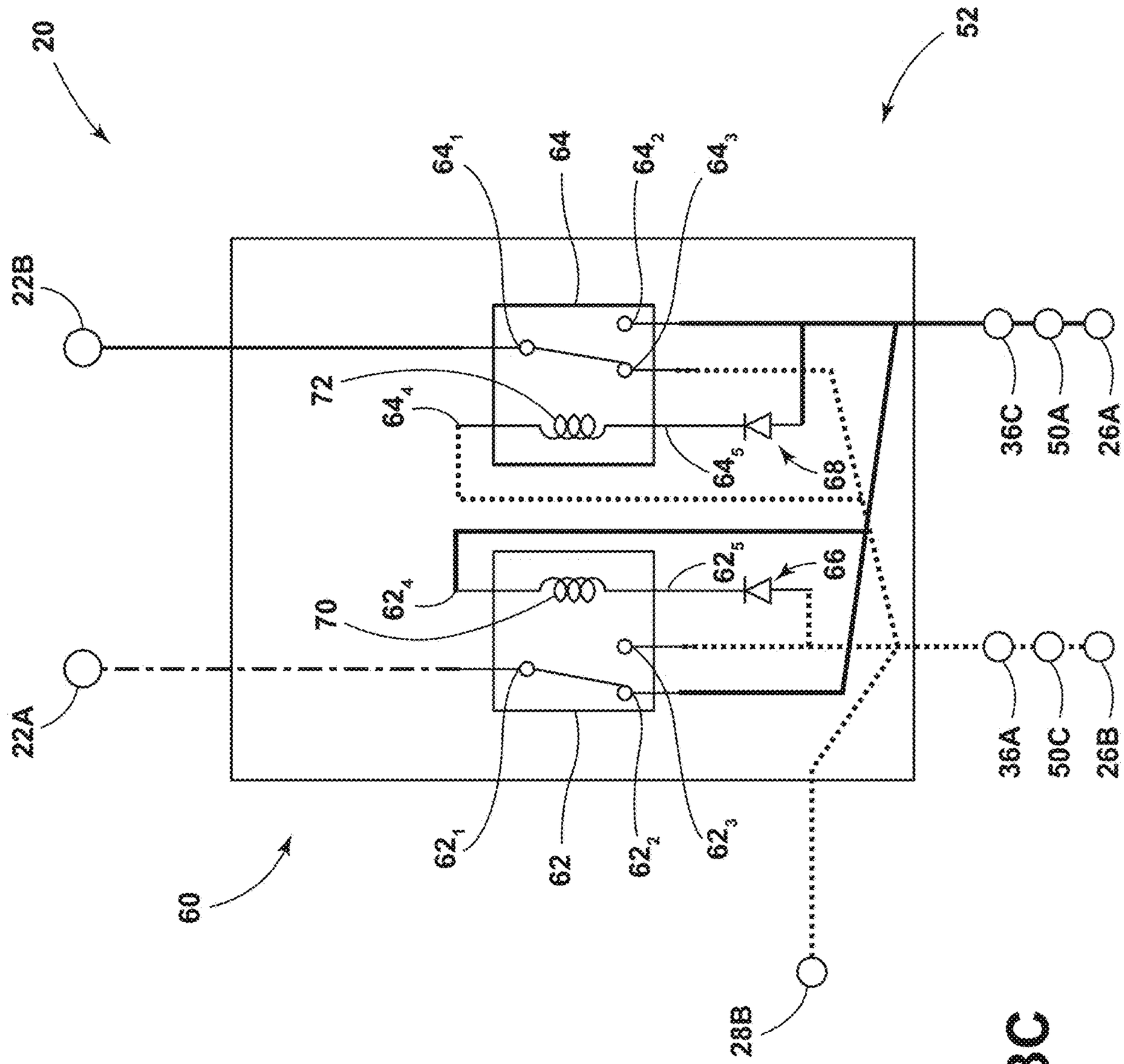
FIG. 3B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28B

FIG. 3C

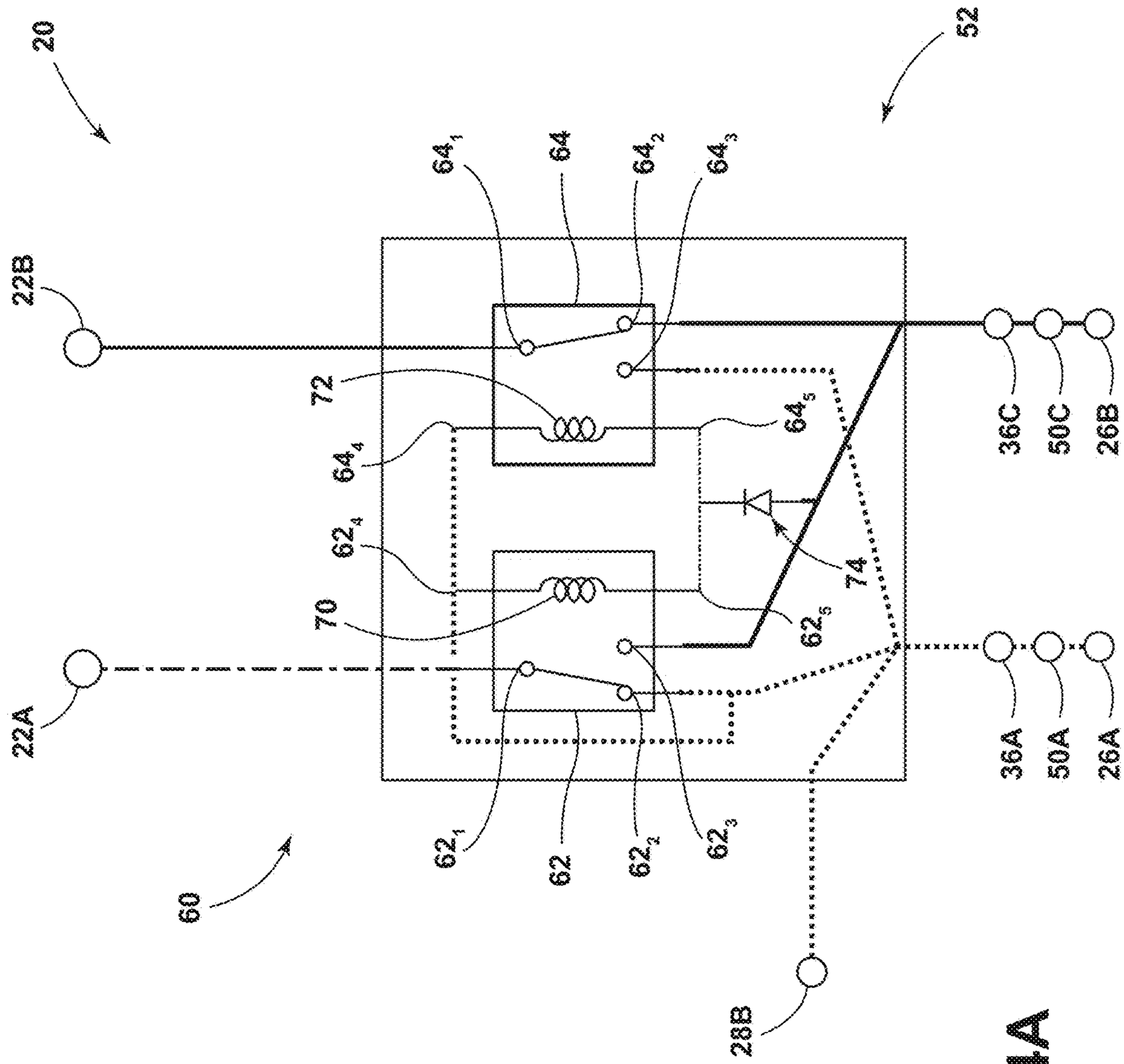
20
52
64_1
64
64_2
64_3
22B
72
64_5
64_4
36C
50C
26B
62_4
74
70
62_5
22A
36A
50A
26A
62_1
62
62_2
62_3
60
28B

FIG. 4A

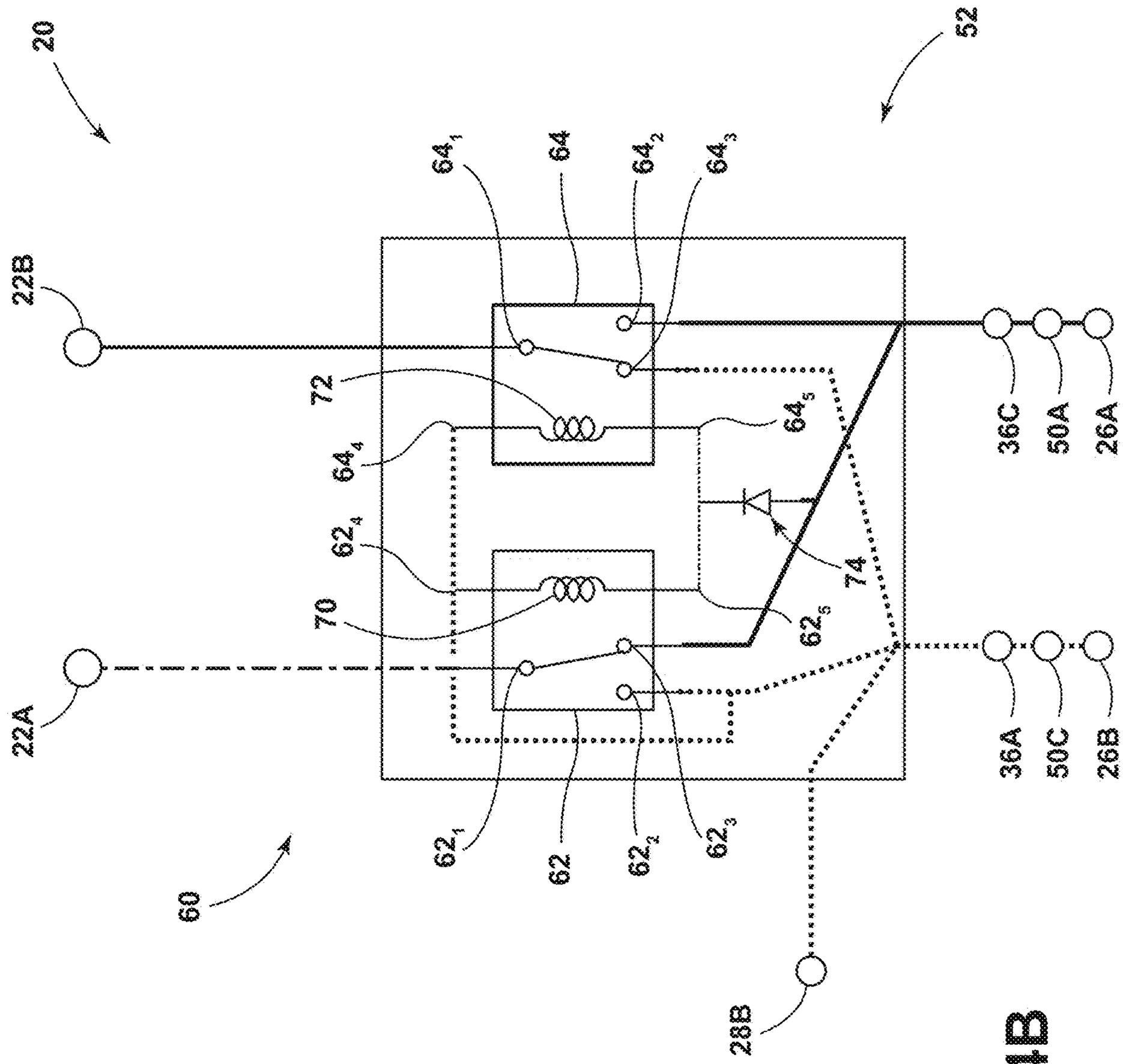
20
52
64_1
64
64_2
64_3
22B
72
64_5
64_4
36C
50A
26A
62_4
74
70
62_5
22A
36A
50C
26B
62_1
62
62_2
62_3
60
28B

FIG. 4B

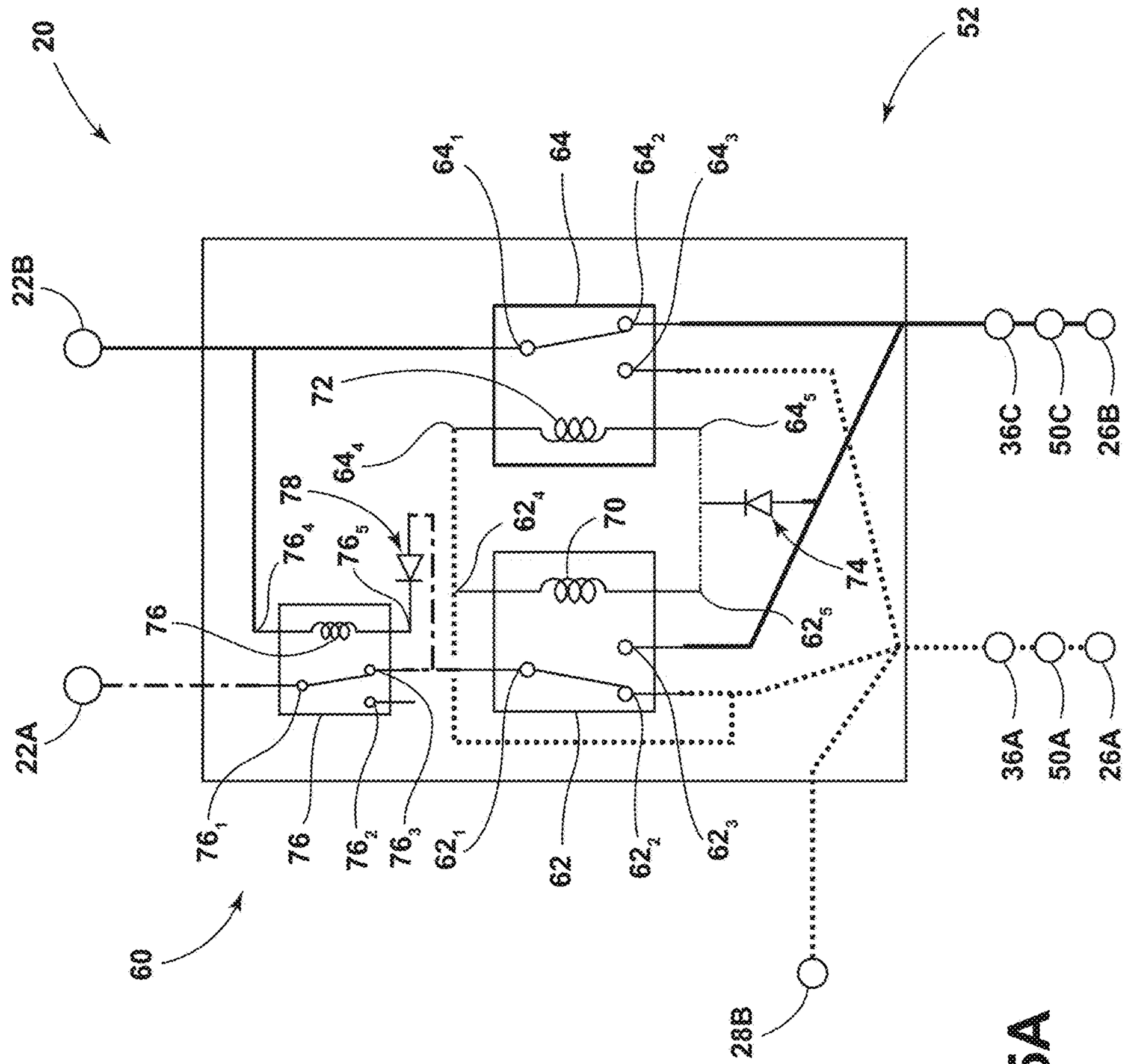
20
52
64_1
64
64_2
64_3
22B
72
64_5
64_4
78
62_4
70
76_4
76_5
74
76
62_5
22A
36C
50C
26B
36A
50A
26A
76_1
76
76_2
76_3
62_1
62
62_2
62_3
60
28B

FIG. 5A

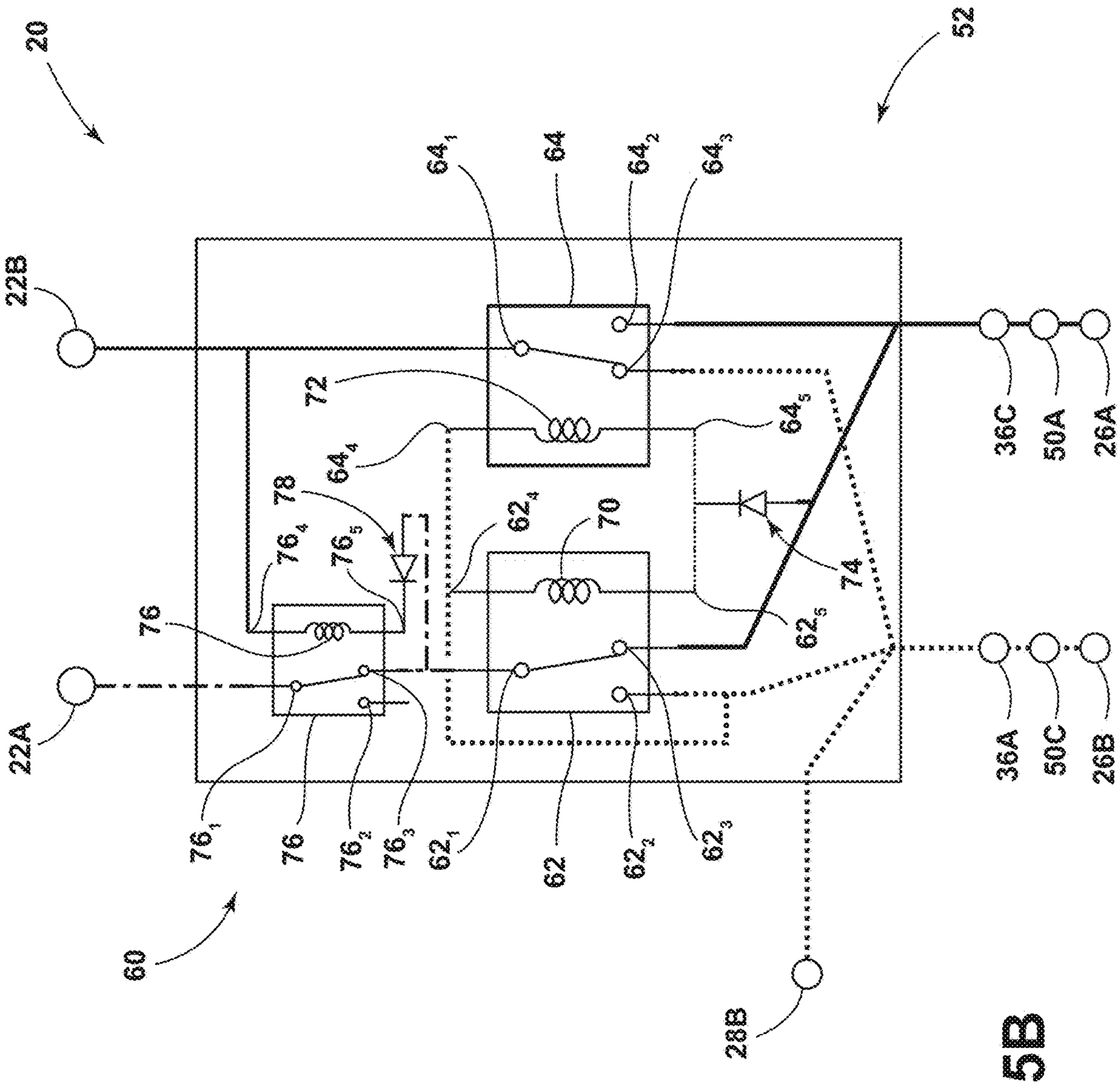
20
52
64$_1$
64
64$_2$
64$_3$
22B
72
64$_5$
64$_4$
78
62$_4$
70
76$_4$
76$_5$
74
76
62$_5$
36C
50A
26A
22A
36A
50C
26B
76$_1$
76
76$_2$
76$_3$
62$_1$
62
62$_2$
62$_3$
60
28B

FIG. 5B

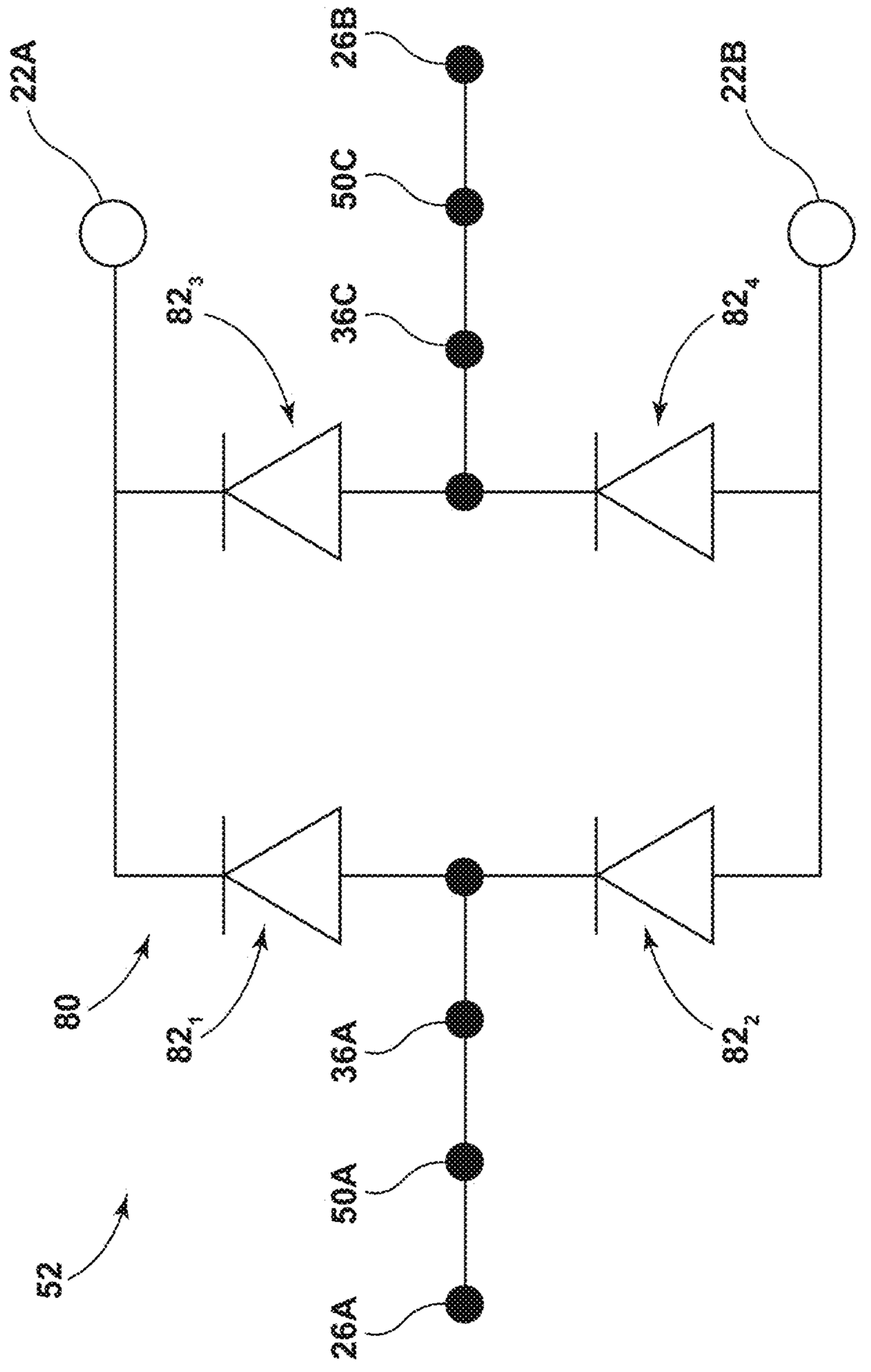

FIG. 6A

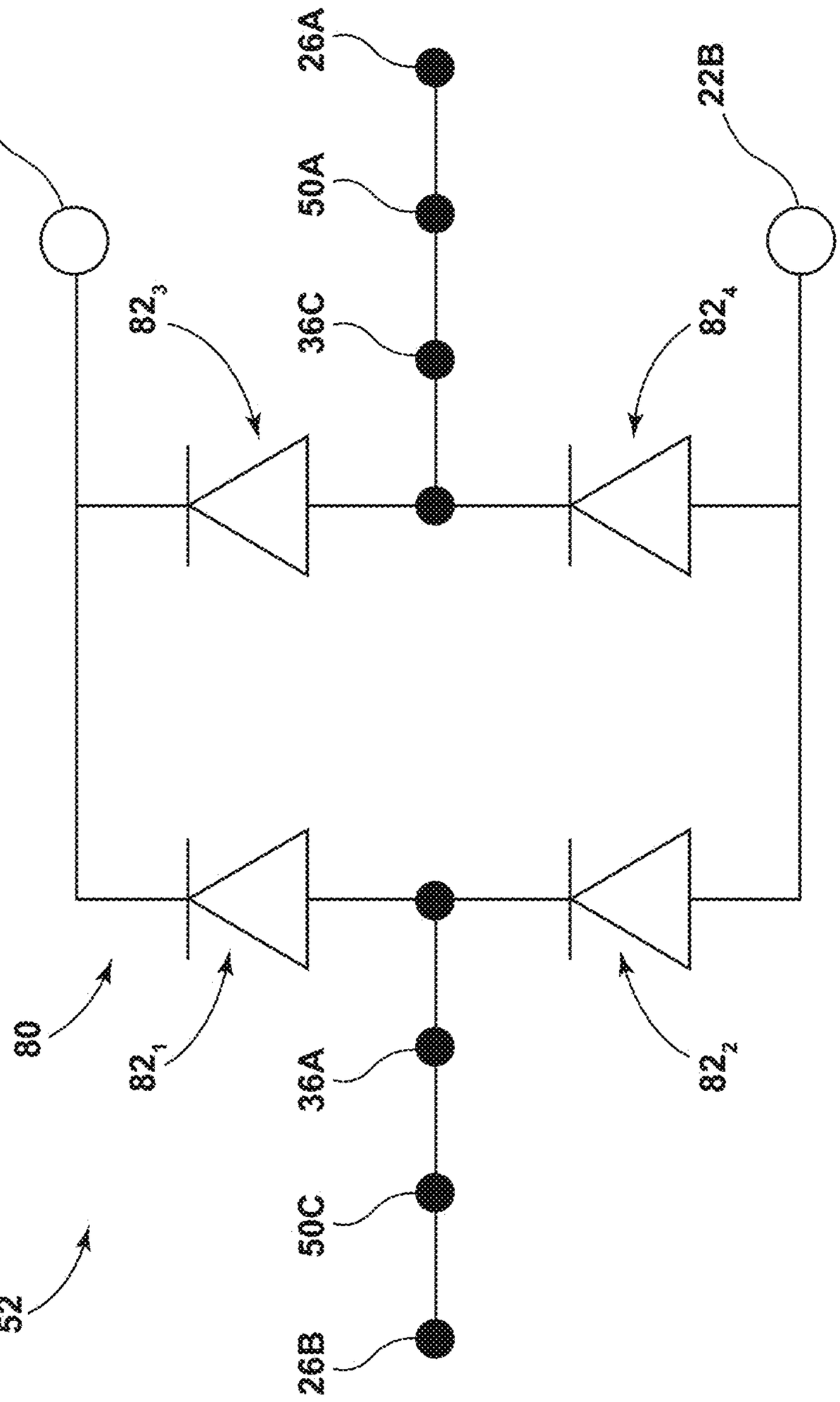

FIG. 6B

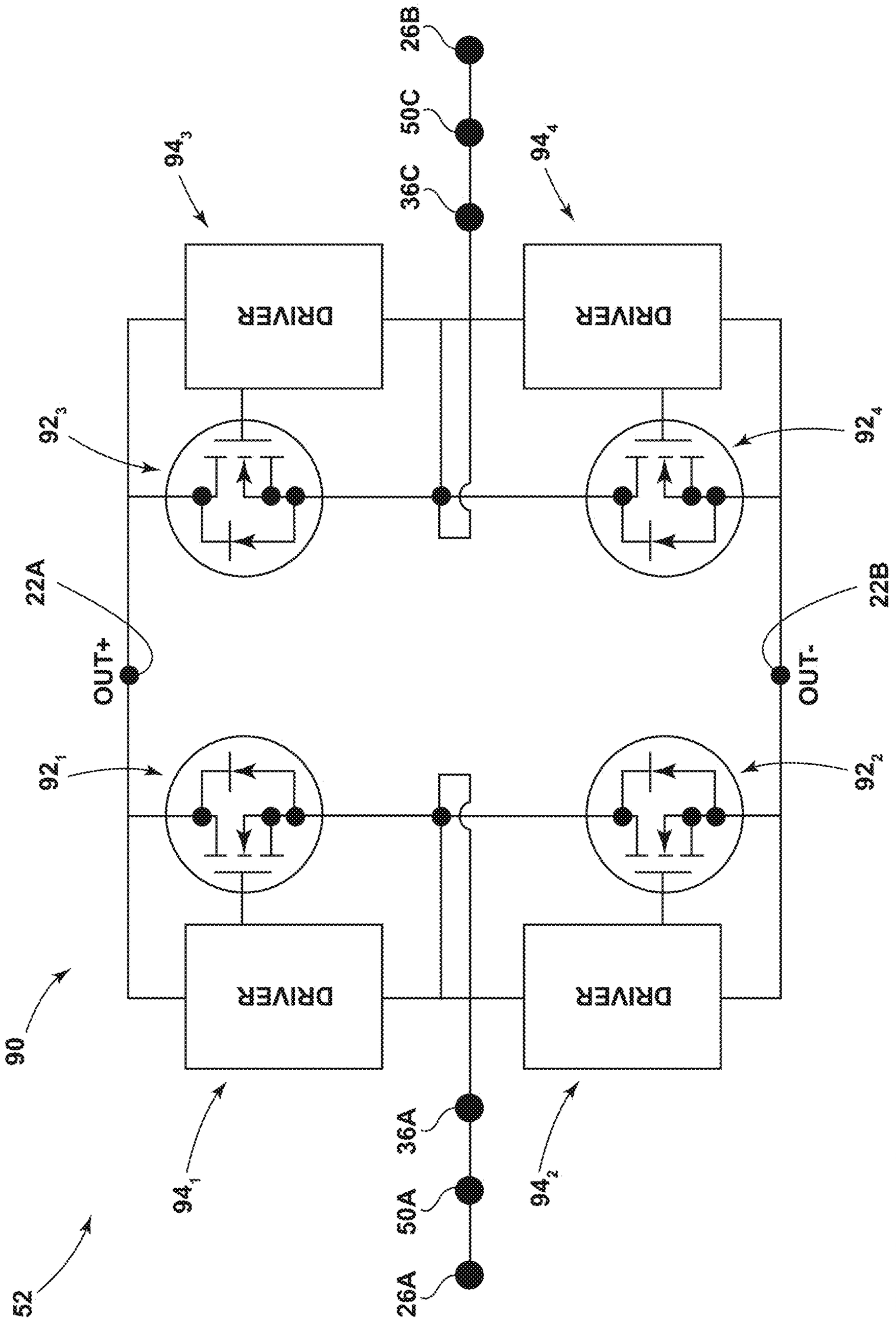
26B
50C
36C
94_3
94_4
DRIVER
DRIVER
92_3
92_4
22A
OUT+
22B
OUT-
92_1
92_2
DRIVER
DRIVER
90
94_1
94_2
36A
50A
26A
52

FIG. 7A

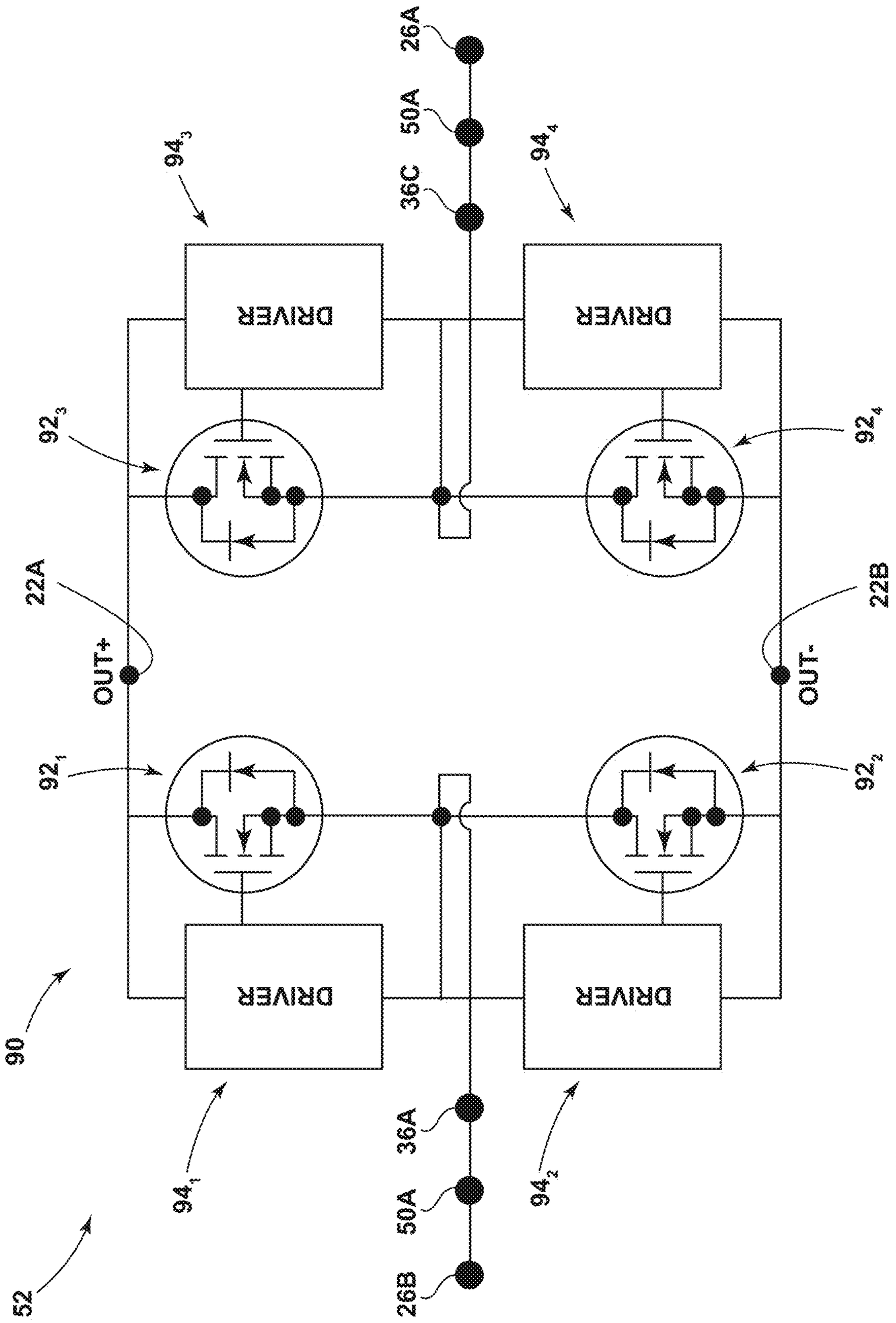
26A
50A
36C
94_3
94_4
DRIVER
DRIVER
92_3
92_4
22A
OUT+
22B
OUT-
92_1
92_2
DRIVER
DRIVER
90
94_1
94_2
36A
50A
26B
52

FIG. 7B

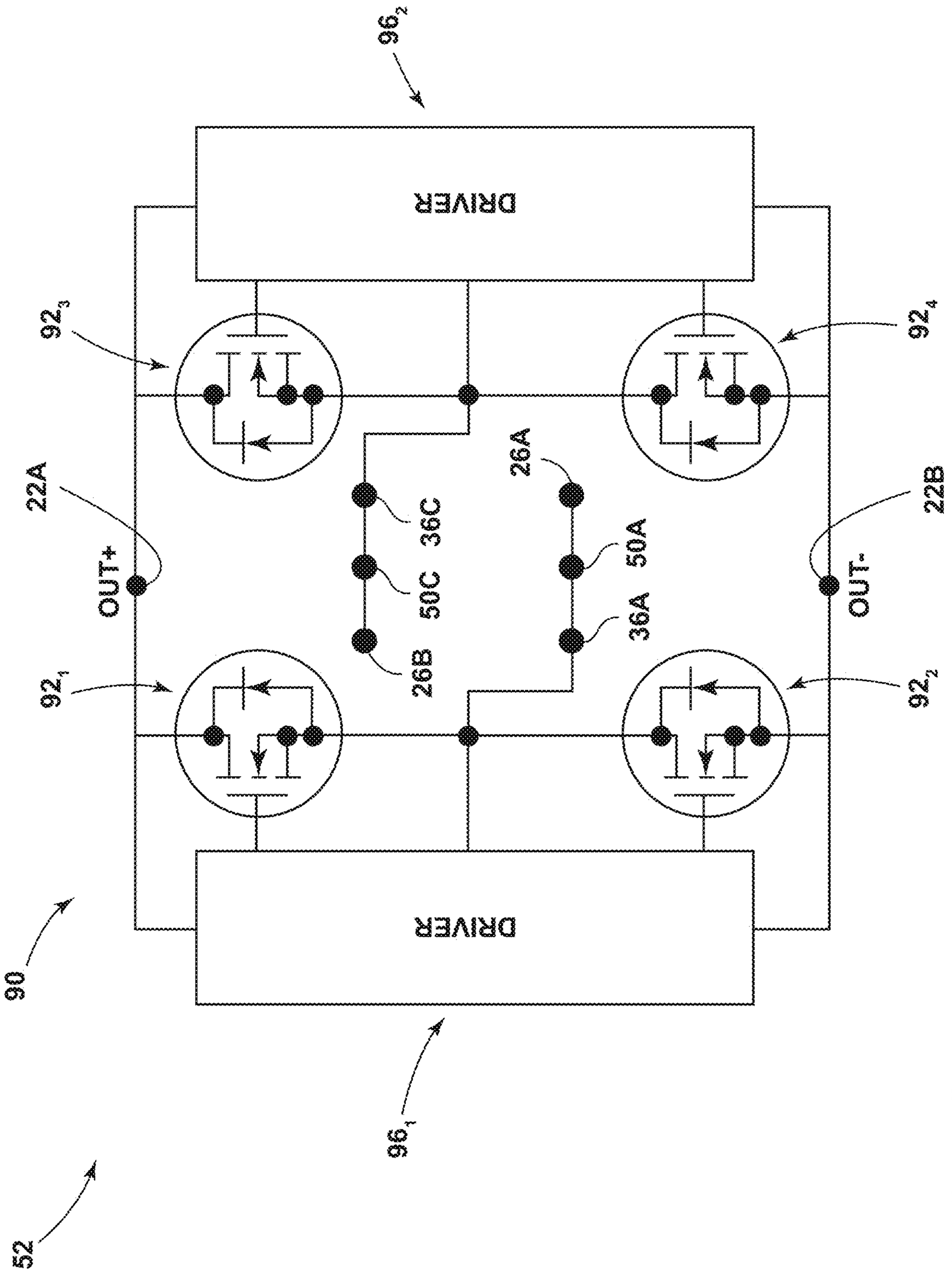
96_2
DRIVER
92_3
92_4
22A
OUT+
26A
36C
50C
26B
50A
36A
22B
OUT-
92_1
92_2
90
DRIVER
96_1
52

FIG. 7C

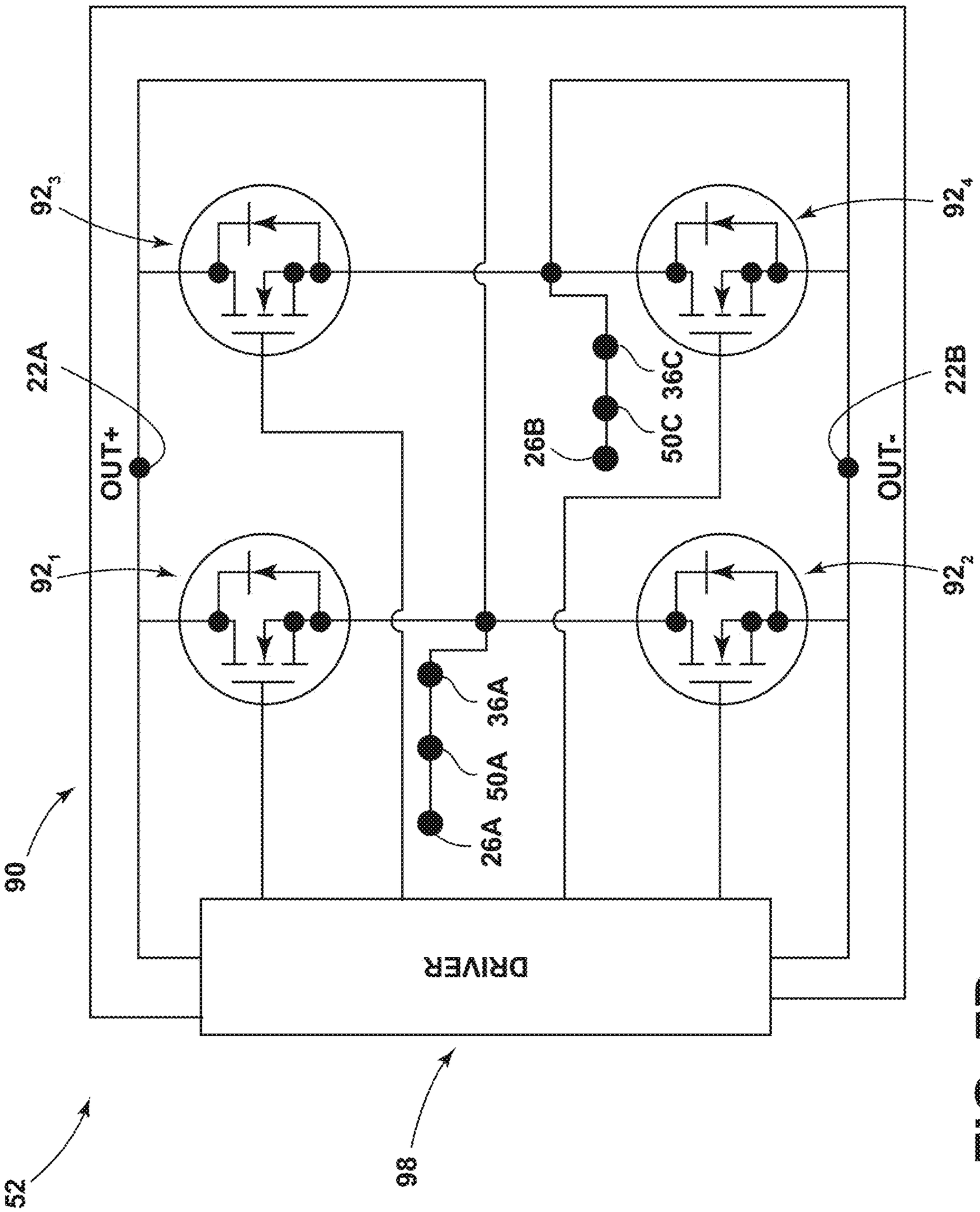
92₃
92₄
22A
OUT+
22B
OUT-
92₁
92₂
26B
50C
36C
26A
50A
36A
90
DRIVER
52
68

FIG. 7D

ELECTRICAL ASSEMBLY

TECHNICAL FIELD

The present disclosure generally relates to electrical assemblies, including electrical assemblies that may be used in connection with tracks, support members, and seats, including vehicle seats and tracks.

BACKGROUND

This background description is set forth below for the purpose of providing context only. Therefore, any aspect of this background description, to the extent that it does not otherwise qualify as prior art, is neither expressly nor impliedly admitted as prior art against the instant disclosure.

Some electrical assemblies may be relatively complex and/or may not provide sufficient functionality. Some electrical assemblies may not be configured for support members, which may be connected to electrical components, to be selectively connected to track assemblies in multiple orientations.

There is a desire for solutions/options that minimize or eliminate one or more challenges or shortcomings of electrical assemblies. The foregoing discussion is intended only to illustrate examples of the present field and should not be taken as a disavowal of scope.

SUMMARY

In embodiments, an electrical assembly may include a track assembly, a control circuit, and/or a support assembly. The track assembly may include a first bus bar, and/or the first bus bar may be configured for connection with a first terminal of a power source. The track assembly may include a second track that may have a second bus bar. The second bus bar may be configured for connection with a second terminal of said power source. The support assembly may be configured for connection with the track assembly in a first orientation and/or in a second orientation. The support assembly may include a positive terminal and/or a negative terminal. The control circuit may be configured to automatically connect the first bus bar to the positive terminal of the support assembly and/or connect the second bus bar to the negative terminal of the support assembly regardless of whether the support assembly is connected to the track assembly in the first orientation or the second orientation. The control circuit may include a first relay, a second relay, a first diode, and/or a second diode. A first coil of the first relay and/or a second coil of the second relay may be configured to be energized when electrically connected to the first bus bar.

With embodiments, if the support assembly is connected to the track in the first orientation, the first diode may be configured to permit current to flow to energize the first coil. If the support assembly is connected to the track in the second orientation, the second diode may be configured to permit current to flow to energize the second coil. The control circuit may be configured such that only one of a first coil of a first relay or a second coil of a second relay may be energized at a time. The support assembly may include a support member. The support member may include a conductor and/or an additional conductor. If the support assembly is in the first orientation, the conductor may be configured to connect to the first bus bar, and/or if the support assembly is in the second orientation, the conductor may be configured to connect to the second bus bar. If the support assembly is in the first orientation, the first bus bar may be connected to the conductor, and/or the control circuit may be configured to connect the first bus bar (and the conductor) to the positive terminal of the support assembly. If the support assembly is in the second orientation, the first bus bar may be connected to the additional conductor, and/or the control circuit may be configured to connect the first bus bar (and the additional conductor) to the positive terminal of the support assembly.

In embodiments, a control circuit may include a first relay, a second relay, and/or a diode. The first relay may include a first coil. The second relay may include a second coil. The diode may be configured to control current flow into the first coil and/or the second coil. If the support assembly is in the first orientation, the first coil and/or the second coil may not be energized, the first bus bar may be connected to the positive terminal of the support assembly, and/or the second bus bar may be connected to the negative terminal of the support assembly. If the support assembly is in the second orientation, the first coil and/or the second coil may not be energized, the first bus bar may be connected to the positive terminal of the support assembly, and/or the second bus bar may be connected to the negative terminal of the support assembly.

With embodiments, the control circuit may include a first relay, a second relay, a third relay, a first diode, and/or a second diode. The first relay may include a first coil, and/or the second relay may include a second coil. The first diode may be connected to the first coil and/or the second coil. The third relay may include a third coil. The second diode may be connected to the third coil and/or the first relay. The third coil may be energized if the support assembly is in either of the first orientation and/or the second orientation. If the support assembly is in the first orientation, the first coil and/or the second coil may not be energized. If the support assembly is in the second orientation, the first coil and/or the second coil may be energized. The third relay may be configured to compensate for a reverse pulse from said power source. If the support assembly is in the first orientation, the first diode may be configured to permit current flow from the first relay to the third relay and/or to the positive terminal of the support assembly. If the support assembly is in the second orientation, the second diode may be configured to permit current flow from the first bus bar to the positive terminal of the support assembly.

The foregoing and other aspects, features, details, utilities, and/or advantages of embodiments of the present disclosure will be apparent from reading the following description, and from reviewing the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side view generally illustrating an embodiment of an electrical assembly according to teachings of the present disclosure.

FIG. **2**A is a cross-sectional view generally illustrating an embodiment of an electrical assembly with a support assembly connected in a first orientation according to teachings of the present disclosure.

FIG. **2**B is a cross-sectional view generally illustrating an embodiment of an electrical assembly with a support assembly connected in a second orientation according to teachings of the present disclosure.

FIGS. **3**A, **3**B, and **3**C are schematic views generally illustrating portions of embodiments of an electrical assembly according to teachings of the present disclosure.

FIGS. **4**A and **4**B are schematic views generally illustrating portions of embodiments of an electrical assembly according to teachings of the present disclosure.

FIGS. **5**A and **5**B are schematic views generally illustrating portions of embodiments of an electrical assembly according to teachings of the present disclosure.

FIGS. **6**A and **6**B are schematic views generally illustrating portions of an embodiment of a control circuit an electrical assembly according to teachings of the present disclosure.

FIGS. **7**A and **7**B are schematic view generally illustrating portions of an embodiment of a control circuit of an electrical assembly according to teachings of the present disclosure.

FIG. **7**C and **7**D are schematic views generally illustrating portions of embodiments of a control circuit of an electrical assembly according to teachings of the present disclosure.

DETAILED DESCRIPTION

Reference will now be made in detail to embodiments of the present disclosure, examples of which are described herein and illustrated in the accompanying drawings. While the present disclosure will be described in conjunction with embodiments and/or examples, it will be understood that they are not intended to limit the present disclosure to these embodiments and/or examples. On the contrary, the present disclosure is intended to cover alternatives, modifications, and equivalents.

In embodiments, such as generally illustrated in FIGS. **1**, **2**A, and **2**B, an electrical assembly **20** may include a support assembly **22**, a support member **30**, a track assembly **38**, and/or a control circuit **52**. The control circuit **52** may include at least one of a switch/relay assembly **60**, a diode assembly **80**, and/or a switch assembly **90**. The support member **30** may support and/or be connected to a seat **30**A. The electrical assembly **20** may be configured to control, at least in part, movement of the support assembly **22**. The support member **30** may be configured for selective connection (e.g., electrical and/or mechanical) with the track assembly **38**. For example and without limitation, the support member **30** may be configured to provide electrical connection between the track assembly **38** and a support assembly **22**, which may include a vehicle seat **30**A and/or other elements that may be connected to the support member **30**. The track assembly **38** may be connected to a mounting surface **24**, such as a vehicle floor.

With embodiments, a support member **30** may be connected to and/or be configured to engage a track assembly **38**. The support member **30** and/or the track assembly **38** may extend substantially longitudinally (e.g., in an X-direction). For example and without limitation, the support member **30** may move (e.g., slide, roll, translate, etc.) in a longitudinal direction along the track assembly **38**. The support member **30** may selectively engage and/or disengage from the track assembly **38**. The support member **30** may be inserted into and/or be removed from the track assembly **38** in a Z-direction (e.g., a vertical direction). The support member **30** may, for example and without limitation, include a cassette configuration.

In embodiments, such as generally illustrated in FIG. **2**A, a track assembly **38** may include a first track **40** and/or a second track **40'**. The first track **40** and/or the second track **40'** may extend substantially in a longitudinal direction (e.g., the X-direction). The first track **40** and the second track **40'** may be substantially the same and/or may be disposed in a mirrored configuration. The first track **40** may be offset in the Y-direction from the second track **40'**. The first track **40** and/or the second track **40'** may include substantially the same length. The support member **30** may include a first portion **32** and/or a second portion **34**. The first portion **32** and/or the second portion **34** may selectively engage the first track **40** and/or the second track **40'**. For example and without limitation, the first portion **32** of the support member **30** may engage the first track **40** and/or the second portion **34** of the support member **30** may engage the second track **40'** (e.g., a forward facing support assembly **22**), and/or the first portion **32** of the support member **30** may engage the second track **40'** and/or the second portion **34** of the support member **30** may engage the first track **40** (e.g., a rearward facing support assembly **22**).

With embodiments, the first track **40** and/or the second track **40'** may include an outer track **42**, **42'** and/or an inner track **44**, **44'**. The outer tracks **42**, **42'** may include a first/bottom wall $\mathbf{42}_1$, $\mathbf{42}_1$', a second wall $\mathbf{42}_2$, $\mathbf{42}_2$', and/or a third wall $\mathbf{42}_3$, $\mathbf{42}_3$'. The bottom wall $\mathbf{42}_1$, $\mathbf{42}_1$', the second wall $\mathbf{42}_2$, $\mathbf{42}_2$', and/or the third wall $\mathbf{42}_3$, $\mathbf{42}_3$' may be connected to form a generally U-shaped configuration. The bottom wall $\mathbf{42}_1$, $\mathbf{42}_1$' may, for example, be substantially planar. The second wall $\mathbf{42}_2$, $\mathbf{42}_2$', and/or the third wall $\mathbf{42}_3$, $\mathbf{42}_3$' may extend perpendicularly (e.g., in the Z-direction) from opposite sides of the bottom wall $\mathbf{42}_1$, $\mathbf{42}_1$'. The second wall $\mathbf{42}_2$, $\mathbf{42}_2$' may include a first portion **42**A, **42**A' and/or the third wall $\mathbf{42}_3$, $\mathbf{42}_3$' may include a second portion **42**B, **42**B'. The first portion **42**A, **42**A' and/or the second portion **42**B, **42**B' may project laterally (e.g., in a Y-direction) toward a center of the track **40**, **40'**. The first portion **42**A, **42**A' and/or the second portion **42**B, **42**B' may be substantially planar. In embodiments, the first portion **42**A, **42**A' and/or the second portion **42**B, **42**B' may be disposed such that a gap **46**, **46'** may be provided between the first portion **42**A, **42**A' and the second portion **42**B, **42**B' (e.g., the first portion **42**A, **42**A' and the second portion **42**B, **42**B' may be offset in the Y-direction). The gap **46** may extend longitudinally along the track **40**, and/or the gap **46** may be centered along the track **40**.

In embodiments, the inner track **44**, **44'** may be disposed at least partially in the outer track **42**, **42'**. The inner track **44**, **44'** may, for example and without limitation, be substantially U-shaped. The inner track **44**, **44'** may include a first wall $\mathbf{44}_1$, $\mathbf{44}_1$', a second wall $\mathbf{44}_2$, $\mathbf{44}_2$', and/or a third wall $\mathbf{44}_3$, $\mathbf{44}_3$'. The second wall $\mathbf{44}_2$, $\mathbf{44}_2$', may be shorter than the third wall $\mathbf{44}_3$, $\mathbf{44}_3$'. The second wall $\mathbf{44}_2$, $\mathbf{44}_2$' and/or the third wall $\mathbf{44}_3$, $\mathbf{44}_3$' may be at least partially bent and/or curved. The second wall $\mathbf{44}_2$, $\mathbf{44}_2$' and the third wall $\mathbf{44}_3$, $\mathbf{44}_3$' may extend perpendicularly (e.g., vertically) from the bottom wall $\mathbf{44}_1$. The bottom wall $\mathbf{44}_1$, $\mathbf{44}_1$' of the inner track **44**, **44'** may be generally aligned with and/or adjacent to the bottom wall $\mathbf{42}_1$, $\mathbf{42}_1$' of the outer track **42**, **42'**. The second wall $\mathbf{44}_2$, $\mathbf{44}_2$' of the inner track **44**, **44'** may be generally aligned with and/or adjacent to the second wall $\mathbf{42}_2$, $\mathbf{42}_2$' of the outer track **42**, **42'**. The third wall $\mathbf{44}_3$, $\mathbf{44}_3$' of the inner track **44**, **44'** may be generally aligned with and/or adjacent to the third wall $\mathbf{42}_3$, $\mathbf{42}_3$' of the outer track **42**, **42'**.

With embodiments, such as generally illustrated in FIG. **2**A and **2**B, the outer track **42** of the first track **40** may include a first recess **48**A and a third recess **48**C. The outer track **42'** of the second track **40'** may include a second recess **48**B and a fourth recess **48**D. The recesses **48**A, **48**B, **48**C, **48**D may be disposed between a top of the second wall $\mathbf{42}_2$, $\mathbf{42}_2$' of the outer track **42**, **42'** and a top of the second wall $\mathbf{44}_2$, $\mathbf{44}_2$' of the inner track **44**, **44'**. The recesses **48**A, **48**B, **48**C, **48**D may extend partially into the second walls $\mathbf{42}_2$, $\mathbf{42}_2$' (e.g., in the Y-direction). The recesses **48**A, **48**B, **48**C,

48D may include one or more of a variety of shapes, sizes, and/or configurations. For example and without limitation, the recesses 48A, 48B, 48C, 48D may be substantially rectangular, circular, and/or curved.

In embodiments, the first track 40 and/or the second track 40' may include one or more bus bars 50A, 50B, 50C, 50D (e.g., electrical conductors). The first track 40 may include a first bus bar 50A and/or a third bus bar 50C. The second track 40' may include a second bus bar 50B and/or a fourth bus bar 50D. The bus bars 50A, 50B, 50C, 50D may include one or more of a variety of shapes, sizes, and/or configurations. For example and without limitation, the bus bars 50A, 50B, 50C, 50D may be substantially U-shaped. The bus bars 50A, 50B, 50C, 50D may extend substantially longitudinally (e.g., in the X-direction). The bus bars 50A, 50B, 50C, 50D may be electrically conductive and/or include an electrically conductive material. The first bus bar 50A may be disposed at least partially in the first recess 48A of the first track 40, the second bus bar 50B may be disposed at least partially in the second recess 48B of the second track 40', the third bus bar 50C may be disposed at least partially in the third recess 48C of the first track 40, and/or the fourth bus bar 50D may be disposed at least partially in the fourth recess 48D of the second track 40'. The bus bars 50A, 50B, 50C, 50D may be disposed at least partially between the outer tracks 42, 42' and the inner tracks 44, 44' (e.g., in the Z-direction). The bus bars 50A, 50B, 50C, 50D may extend along part of or along the entire length of the first track 40 and/or second track 40'. The bus bars 50A, 50B may be electrically connected to a power source 26 (e.g., a vehicle battery) and may be configured to provide power from the power source 26 to the support member 30 at some or all points along the track 40.

With embodiments, the bus bars 50A, 50B may be configured for connection with a power source 26 and/or the first ECU 28A. For example and without limitation, the first bus bar 50A and/or the second bus bar 50B may be configured for connection to the power source 26. The first bus bar 50A and/or the second bus bar 50B may be configured to provide power to a support assembly 22 via the support member 30. The first bus bar 50A may connect to a first/positive terminal 26A of the power source 26, and/or the second bus bar 50B may connect to a second/negative terminal 26B, which may be connected to ground, of the power source 26. The first bus bar 50A and/or the second bus bar 50B may supply power to the second ECU 28B and/or to one or more electrical components 22C, $22C_1$, $22C_2$ (e.g., motors, heaters, fans, haptic devices, etc. as generally illustrated in FIGS. 1-2B) of support assembly 22 that may provide one or more functions (e.g., support assembly movement, heating, cooling, massage, etc.).

In embodiments, such as generally illustrated in FIGS. 2A and 2B, the support member 30 may include one or more conductors (e.g., conductors 36A, 36B, 36C, 36D). A first portion 32 of the support member 30 may include a first conductor 36A and/or a third conductor 36C. The second portion 34 of the support member 30 may include a second conductor 36B and/or a fourth conductor 36D. In a first orientation of the support assembly 22, the first conductor 36A may be configured for connection with the first bus bar 50A and/or the second conductor 36B may be configured for connection with the second bus bar 50B (see, e.g., FIG. 2A).

With embodiments, in a second orientation of the support assembly 22, the first conductor 36A may be configured for connection with the second bus bar 50B and/or the second conductor 36B may be configured for connection with the first bus bar 50A (see, e.g., FIG. 2B). In embodiments, the conductors 36A, 36B, 36C, 36D may include one or more of a variety of shapes, sizes, and/or configurations. For example and without limitation, the conductors 36A, 36B, 36C, 36D may be oval-shaped, rectangular, curved, rounded, and/or oblong. The conductors 36A, 36B, 36C, 36D may be substantially planar.

With embodiments, an electrical assembly 20 may include a first ECU 28A and/or a second ECU 28B. The first ECU 28A and/or the second ECU 28B may be configured to communicate with (e.g., receive information from, send information to, digitally communicate with, and/or sense a status/voltage of, etc.) the control circuit 52, such as with the switch/relay assembly 60, the diode assembly 80, and the switch assembly 90. The first ECU 28A and/or the second ECU 28B may be configured to sense the status of the control circuit 52 (e.g., such as voltage). The first ECU 28A may be connected to the track assembly 38. The second ECU 28B may be connected to the support member 30. The second ECU 28B may, for example and without limitation, be configured to control one or more functions/electrical components 22C of the support assembly 22. The control circuit 52 may be connected between (e.g., electrically) the bus bars 50A, 50B and the second ECU 28B. The first ECU 28A may be configured to receive information about the orientation of the support member 30 (and a seat 30A that may be connected thereto), such as via the second ECU 28B and/or the control circuit 52. For example and without limitation, the first ECU 28A may be configured to receive information from the second ECU 28B and/or the control circuit 52 indicating whether the support assembly 22 is forward facing or rearward facing.

In embodiments, the control circuit 52 may include a switch/relay assembly 60. The relay assembly 60 may be configured to connect the appropriate support assembly terminals 22A, 22B to the power source 26. For example and without limitation, the relay assembly 60 may be configured to connect the correct terminals 26A, 26B of the power source 26 to the appropriate support assembly terminals 22A, 22B (e.g., such that the first terminal 22A of the support assembly 22 is connected to the first terminal 26A of the power source 26 and the second terminal 22B is connected to the second terminal 26B of the power source 26, regardless of the orientation of the support assembly 22). The relay assembly 60 may include one or more relays (e.g., relays 62, 64) and/or one or more diodes (e.g., diode 74). The one or more relays may, for example and without limitation, include one or more electromechanical relays and/or one or more solid state relays. Upon connecting the support member 30 to the track 40, the relay assembly 60 may automatically connect the positive terminal 26A of the power source 26 to a positive terminal 22A of the support assembly 22. Additionally or alternatively, the relay assembly 60 may automatically connect the negative (e.g., ground) terminal 26B of the power source 26 to the negative terminal 22B of the support assembly 22. The relay assembly 60 may be disposed at least partially in the support member 30 and/or in the seat 30A.

With embodiments, such as generally shown in FIGS. 3A, 3B, and 3C, the control circuit 52 (e.g., the relay assembly 60) may be configured to automatically connect the power source 26 to the correct terminals 22A, 22B of the support assembly 22 regardless of the orientation of the support assembly 22. The relay assembly 60 may include a first relay 62, a second relay 64, a first diode 66, and/or a second diode 68. The first relay 62 and/or the second relay 64 may include a first contact 62_1, 64_1, a second contact 62_2, 64_2, a third contact 62_3, 64_3, a fourth contact 62_4, 64_4, and/or a fifth contact 62_5, 64_5. The relays 62, 64 may be configured to

selectively electrically connect the first contacts 62_1, 64_1 with the second contacts 62_2, 64_2 or the third contacts 62_3, 64_3.

In embodiments, the first relay **62** may be connected to the first diode **66** and/or the second relay **64** may be connected to the second diode **68**. The first relay **62** (e.g., the first contact 62_1) may be connected to the positive terminal **22**A of the support assembly **22**, and/or the second relay **64** (e.g., the first contact 64_1) may be connected to the negative terminal **22**B (e.g., ground) of the support assembly **22**. The first relay **62** and/or the second relay **64** may include a first coil **70** and/or a second coil **72**, respectively. The coils **70**, **72** may be connected between the fourth contacts 62_4, 64_4 and the fifth contacts 62_5, 64_5 of the first relay **62** and the second relay **64**, respectively. The first diode **66** may be connected to the fifth contact 62_5 of the first relay **62**. The first diode **66** may permit current flow into the fifth contact 62_5 and/or may restrict current flow out of the fifth contact 62_5. The second diode **68** may be connected to the fifth contact 64_5 of the second relay **64**. The second diode **68** may permit current flow into the fifth contact 64_5 and/or may restrict current flow out of the fifth contact 64_5. The second contact 62_2 of the first relay **62** may be connected to the fourth contact 62_4 of the first relay **62**, the second contact 64_2 of the second relay **64**, the second diode **68**, and/or the second conductor **36**B. The third contact 62_3 of the first relay **62** may be connected to the first diode **66**, the fourth contact 64_4 of the second relay **64**, the third contact 64_3 of the second relay **64**, the first conductor **36**A, and/or the second ECU **28**B (e.g., to output support assembly position information).

With embodiments, such as generally shown in FIG. **3**A, the relay assembly **60** may include a first state (e.g., an initial state). When the relay assembly **60** is in the first state, the support assembly **22** may not be connected to the track assembly **38**, and/or the support assembly **22** may not be connected to the power source **26**. In the first state of the relay assembly **60**, the first contact 62_1 of the first relay **62** may be connected to the second contact 62_2, and/or the first contact 64_1 of the second relay **64** may be connected to the second contact 64_2. Additionally or alternatively, in the first state of the relay assembly **60**, the first conductor **36**A and/or the second conductor **36**B may not be connected to the first bus bar **50**A and/or the second bus bar **50**B.

In embodiments, such as generally illustrated in FIG. **3**B, the relay assembly **60** may include a second state which may correspond to the support assembly **22** being disposed in a first/forward-facing orientation and connected to the track assembly **38**. When the relay assembly **60** is in the second state, the support assembly **22** may be connected to the track **40** and/or the support assembly **22** may be connected to the power source **26**, such as via the first conductor **36**A that may be connected to the first bus bar **50**A (which may be connected to the positive terminal **26**A) and/or via the second conductor **36**B that may be connected to the second bus bar **50**B (which may be connected to the negative terminal **26**B).

With embodiments, connecting the positive terminal **26**A of the power source **26** to the first conductor **36**A may cause the first coil **70** to trigger (e.g., energize), which may connect the first contact 62_1 of the first relay **62** to the third contact 62_3 instead of the second contact 62_2. Current may flow from the positive terminal **26**A to the first bus bar **50**A, to the first conductor **36**A, through the first relay **62**, and/or to the positive terminal **22**A of the support assembly **22**. The second coil **72** may not be energized, and/or the second diode **68** may prevent the second coil **72** from energizing when the first coil **70** is energized. In the second state, the first contact 64_1 and second contact 64_2 of the second relay **64** may remain connected. For example and without limitation, current may flow from the negative terminal **22**B to the first contact 64_1, to the second contact 64_2, to the second conductor **36**B, to the second bus bar **50**B, and/or to the negative terminal **26**B of the power source **26**.

In embodiments, such as generally illustrated in FIG. **3**C, the relay assembly **60** may include a third state that may correspond to the support assembly **22** being disposed in a rearward-facing orientation. When the relay assembly **60** is in the third state, the support assembly **22** may be connected to the track **40** and/or the support assembly **22** may be connected to the power source **26**. When the relay assembly **60** is in the third state, the first bus bar **50**A may be connected to the second conductor **36**B, which may connect the positive terminal **26**A of the power source **26** to the second conductor **36**B. Additionally or alternatively, in the third state of the relay assembly **60**, the second bus bar **50**B may be connected to the first conductor **36**A, which may connect the negative terminal **26**B of the power source **26** to the first conductor **36**A.

With embodiments, connecting the positive terminal **26**A of the power source **26** to the second conductor **36**B may cause the second coil **72** to trigger (e.g., energize), which may connect the first contact 64_1 of the second relay **64** to the third contact 64_3 instead of the second contact 64_2. Current may flow from positive terminal **26**A to the first bus bar **50**A, to the second conductor **36**B, through the first relay **62**, and/or to the positive terminal **22**A of the support assembly **22**. The first coil **70** may not be energized, and/or the first diode **66** may prevent the first coil **70** from energizing when the second coil **72** is energized. The second bus bar **50**B may be connected to the third contact 64_3 of the second relay **64** and/or may be connected to the first contact 64_1 of the second relay **64** such as to connect to the negative terminal **22**B of the support assembly **22**.

In embodiments, such as generally shown in FIGS. **4**A and **4**B, a control circuit **52** (e.g., relay assembly **60**) may be configured to automatically connect the power source **26** to the correct terminals **22**A, **22**B of the support assembly **22** regardless of orientation. The relay assembly **60** may include a first relay **62**, a second relay **64**, and/or a diode **74**. The first relay **62** and/or the second relay **64** may be connected to the diode **74**. The first relay **62** (e.g., the first contact 62_1) may be connected to the positive terminal **22**A of the support assembly **22**, and/or the second contact 64_2 of the second relay **64** may be connected to the negative terminal **22**B of the support assembly **22**. The diode **74** may be connected to the fifth contact 62_5 of the first relay **62** and the fifth contact 64_5 of the second relay **64**. The diode **74** may permit current flow from the second conductor **36**B to the fifth contacts 62_5, 64_5 of the relays **62**, **64** (and from the fifth contacts 62_5, 64_5 to the fourth contacts 62_4, 64_4), and/or may restrict current flow from the fifth contacts 62_5, 64_5 to the second conductor **36**B (e.g., to prevent energizing the coils **70**, **72** in the first orientation). The second contact 62_2 of the first relay **62** may be connected to the first conductor **36**A, the fourth contact 62_4 of the first relay **62**, the fourth contact 64_4 of the second relay **64**, the third contact 64_3 of the second relay **64**, and/or the second ECU **28**B (e.g., to output seat position or other information). The third contact 62_3 of the first relay **62** may be connected to the second conductor **36**B, the diode **74**, and/or the second contact 64_2 of the second relay **64**.

With embodiments, such as generally illustrated in FIG. **4**A, the relay assembly **60** may include a first state that may correspond to the support assembly **22** being disposed in a first/forward-facing orientation. When the relay assembly **60**

is in the first state, the support assembly **22** may be connected to the track **40** and/or support assembly **22** may be connected to the power source **26**. When the relay assembly **60** is in the first state, the first bus bar **50**A may be connected to the first conductor **36**A, which may connect the first conductor **36**A with the positive terminal **26**A of the power source **26**. Additionally or alternatively, in the first state of the relay assembly **60**, the second bus bar **50**B may be connected to the second conductor **36**B, which may connect the second conductor **36**B with the negative terminal **26**B of the power source **26**.

In embodiments, connecting the positive terminal **26**A of the power source **26** to the first conductor **36**A may not cause the first coil **70** and/or the second coil **72** to trigger (e.g., energize). The first contacts $\mathbf{62}_1$, $\mathbf{64}_1$ of the relays **62**, **64** may remain connected to the second contacts $\mathbf{62}_2$, $\mathbf{64}_2$. Current may flow from the positive terminal **26**A of the power source **26** to the first bus bar **50**A, to the first conductor **36**A, through the first relay **62**, and/or to the positive terminal **22**A of the support assembly **22**. The first coil **70** and/or the second coil **72** may not be energized, and/or the diode **74** may prevent the first coil **70** and/or the second coil **72** form energizing when the support assembly **22** is in the forward-facing orientation. The second bus bar **50**B may be connected via the second conductor **36**B to the second contact $\mathbf{64}_2$ of the second relay **64** and/or may be connected to the first contact $\mathbf{64}_1$ of the second relay **64**, such as to connect the negative terminal **26**B of the power source **26** to the negative terminal **22**B of the support assembly **22**.

With embodiments, such as generally illustrated in FIG. **4**B, the relay assembly **60** may include a second state that may correspond to the support assembly **22** being disposed in a second/rearward facing orientation. When the relay assembly **60** is in the second state, the support assembly **22** may be connected to the track **40** and/or the support assembly **22** may be connected to the power source **26**. When the relay assembly **60** is in the second state, the first bus bar **50**A may be connected to the second conductor **36**B, which may connect the second conductor **36**B with the positive terminal **26**A of the power source **26**. Additionally or alternatively, in the second state of the relay assembly **60**, the second bus bar **50**B may be connected to the first conductor **36**A, which may connected the first conductor **36**A with the negative terminal **26**B of the power source **26**.

In embodiments, connecting the positive terminal **26**A of the power source **26** to the first conductor **36**A may cause the first coil **70** and/or the second coil **72** to trigger (e.g., trip/energize) which may connect the first contacts $\mathbf{62}_1$, $\mathbf{64}_1$ of the relays **62**, **64** to the third contacts $\mathbf{62}_3$, $\mathbf{64}_3$ instead of the second contacts $\mathbf{62}_2$, $\mathbf{64}_2$. Current may flow from the positive terminal **26**A to the first bus bar **50**A, to the second conductor **36**B, through the first relay **62**, and/or to the positive terminal **22**A of the support assembly **22**. The diode **74** may prevent current from flowing through the second relay **64** to the negative terminal **22**B of the support assembly **22**. The second bus bar **50**B (e.g., ground) may be connected to the third contact $\mathbf{64}_3$ of the second relay **64**, which may be connected to the first contact $\mathbf{64}_1$ of the second relay **64** (which may be connected to the negative terminal **22**B of the support assembly **22**).

With embodiments, such as generally illustrated in FIGS. **5**A and **5**B, a control circuit **52** (e.g., the relay assembly **60**) may include a first relay **62**, a second relay **64**, a third relay **76**, a first diode **74**, and/or a second diode **78** (e.g., a pulse diode). The third relay **76** may include a first contact $\mathbf{76}_1$, a second contact $\mathbf{76}_2$, a third contact $\mathbf{76}_3$, a fourth contact $\mathbf{76}_4$, and/or a fifth contact $\mathbf{76}_5$. The third relay **76** may include a third coil **76**A that may be connected between the fourth contact $\mathbf{76}_4$ and the fifth contact $\mathbf{76}_5$. The first contact $\mathbf{76}_1$ may be connected to the second contact $\mathbf{76}_2$, which may be configured as an open contact, when the third coil **76**A is not energized, and/or the first contact $\mathbf{76}_1$ may be connected to the third contact $\mathbf{76}_3$ when the third coil **76**A is energized. The first contact $\mathbf{76}_1$ of the third relay **76** may be connected to the positive terminal **22**A of the support assembly **22**. The fourth contact $\mathbf{76}_4$ of the third relay **76** may be connected to the first contact $\mathbf{64}_1$ of the second relay **64** and/or the negative terminal **22**B (e.g., ground) of the support assembly **22**. The pulse diode **78** may be connected to the third contact $\mathbf{76}_3$ of the third relay **76**, the fifth contact $\mathbf{76}_5$ of the third relay **76**, and/or the first contact $\mathbf{62}_1$ of the first relay **62**. The pulse diode **78** may be configured to permit current flow into the fifth contact $\mathbf{76}_5$ of the third relay **76** and/or may restrict or prevent current flow out from the fifth contact $\mathbf{76}_5$ (e.g., to prevent energizing the coils **70**, **72** in the first orientation). The first contact $\mathbf{62}_1$ of the first relay **62** may be connected to the third contact $\mathbf{76}_3$ of the third relay **76**.

In embodiments, the third relay **76** and/or the pulse diode **78** of the relay assembly **60** may isolate the first relay **62** and/or the second relay **64** during switching (e.g., coil energizing). Switching the polarity of the contacts at the first conductor **36**A and/or second conductor **36**B may result in a reverse battery pulse. The pulse diode **78** and/or third relay **76** switching delay may limit the reverse battery pulse from affecting the support assembly **22** (e.g., internal circuity of the support assembly **22**, the second ECU **28**B, and/or electrical components **22**C that may be connected to the support assembly **22**).

In embodiments, such as generally illustrated in FIG. **5**A, the relay assembly **60** may include a first state that may correspond to the support assembly **22** being disposed in a first/forward-facing orientation. When the relay assembly **60** is in the first state, the support assembly **22** may be connected to the track **40** and/or the support assembly **22** may be connected to the power source **26**. When the relay assembly **60** is in the first state, the first bus bar **50**A may be connected to the first conductor **36**A, which may connect the first conductor **36**A with the positive terminal **26**A of the power source **26**. Additionally or alternatively, in the first state of the relay assembly **60**, the second bus bar **50**B may be connected to the second conductor **36**B, which may connect the second conductor **36**B with the negative terminal **26**B of the power source **26**.

With embodiments, connecting the positive terminal **26**A of the power source **26** to the first conductor **36**A may not cause the first coil **70** and/or the second coil **72** to trigger (e.g., energize). The first contacts $\mathbf{62}_1$, $\mathbf{64}_1$ of the relays **62**, **64** may remain connected to the second contacts $\mathbf{62}_2$, $\mathbf{64}_2$. Connecting the positive terminal **22**A to the first conductor **36**A may cause the third coil **76**A to energize. For example and without limitation, current may flow from the positive terminal **26**A, to the first bus bar **50**A, to the first conductor **36**A, to the first contact $\mathbf{62}_1$ of the first relay **62**, to the pulse diode **78**, to the fifth contact $\mathbf{76}_5$ of the third relay **76**, and to the third coil **76**A, which may energize the third coil **76**A. Energizing the third coil **76**A may cause the first contact $\mathbf{76}_1$ of the third relay **76** to disconnect from the second contact $\mathbf{76}_2$ and connect to the third contact $\mathbf{76}_3$, which may connect the positive terminal **26**A of the power source **26** to the positive terminal **22**A of the support assembly **22**.

In embodiments, such as generally illustrated in FIG. **5**B, the relay assembly **60** may include a second state that may correspond to the support assembly **22** being disposed in a second/rearward-facing orientation. When the relay assem-

bly **60** is in the second state, the support assembly **22** may be connected to the track assembly **38** and/or support assembly **22** may be connected to the power source **26**. When the relay assembly **60** is in the second state, the first bus bar **50**A may be connected to the second conductor **36**B, which may connect the second conductor **36**B with the positive terminal **26**A of the power source **26**. Additionally or alternatively, in the second state of the relay assembly **60**, the second bus bar **50**B may be connected to the first conductor **36**A, which may connected the first conductor **36**A with the negative terminal **26**B of the power source **26**.

With embodiments, connecting the positive terminal **26**A of the power source **26** to the second conductor **36**B may cause the first coil **70** and/or the second coil **72** to trigger (e.g., energize). The first contacts $\mathbf{62}_1$, $\mathbf{64}_1$ of the first relay **62** and the second relay **64** may disconnect from the second contacts $\mathbf{62}_2$, $\mathbf{64}_2$ and/or may connect to the third contacts $\mathbf{62}_3$, $\mathbf{64}_3$. Current may flow from the positive terminal **26**A of the power source **26** to the first bus bar **50**A, to the second conductor **36**B, to the third contact **623** of the first relay **62**, to the first contact $\mathbf{62}_1$ of the first relay **62**, to the third contact $\mathbf{76}_3$ of the third relay **76**, and/or to the pulse diode **78**, which may energize the third coil **76**A. Energizing the third coil **76**A may cause the first contact $\mathbf{76}_1$ of the third relay **76** to disconnect from the second contact $\mathbf{76}_2$ and connect to the third contact $\mathbf{76}_3$, which may connect the positive terminal **26**A of the power source **26** to the positive terminal **22**A of the support assembly **22** via the second conductor **36**B.

In embodiments, such as generally illustrated in FIGS. **6**A and **6**B, a control circuit **52** may include a diode assembly **80**. The diode assembly **80** may include diodes (e.g., diodes $\mathbf{82}_1$, $\mathbf{82}_2$, $\mathbf{82}_3$, $\mathbf{82}_4$) and may or may not include electromechanical components such as relays and/or switches. The diode assembly **80** may be configured to connect the correct terminals **26**A, **26**B of the power source **26** to the appropriate support assembly terminals **22**A, **22**B (e.g., such that the first terminal **22**A of the support assembly **22** is connected to the first terminal **26**A of the power source **26** and the second terminal **22**B is connected to the second terminal **26**B of the power source **26**, regardless of the orientation of the support assembly **22**). The diode assembly **80** may include a first diode $\mathbf{82}_1$, a second diode $\mathbf{82}_2$, a third diode $\mathbf{82}_3$, and/or a fourth diode $\mathbf{82}_4$. The first diode $\mathbf{82}_1$, the second diode $\mathbf{82}_2$, the third diode $\mathbf{82}_3$, and the fourth diode $\mathbf{82}_4$ may be connected as a bridge circuit. The first conductor **36**A may be connected between the first diode $\mathbf{82}_1$ and the second diode $\mathbf{82}_2$. The second conductor **36**B may be connected between the third diode $\mathbf{82}_3$ and the fourth diode $\mathbf{82}_4$. A diode assembly **80** may include and/or be connected to one or more other passive electrical components (e.g., additional diodes or other components).

In embodiments, such as generally illustrated in FIG. **6**A, if the support assembly **22** is in a first/forward orientation, the first conductor **36**A may be connected to the first bus bar **50**A and the positive terminal **26**A of the power source **26** and/or the second conductor **36**B may be connected to the second bus bar **50**B and the negative terminal **26**B of the power source **26**. Current may flow from the positive terminal **26**A to the first bus bar **50**A, to the first conductor **36**A, through the first diode $\mathbf{82}_1$, and to the first terminal **22**A of the support assembly **22**. In the first orientation, the second diode $\mathbf{82}_2$ and/or the third diode $\mathbf{82}_3$ may block current from flowing from the positive terminal **26**A to the second terminal **22**B of the support assembly **22**. In the first orientation, current may flow from the second terminal **22**B of the support assembly **22** through the fourth diode $\mathbf{82}_4$ to the second conductor **36**B, the second bus bar **50**B, and/or the negative terminal **26**B of the power source **26**.

In embodiments, such as generally illustrated in FIG. **6**B, if the support assembly **22** is in a second/rearward orientation, the first conductor **36**A may be connected to the second bus bar **50**B and the negative terminal **26**B of the power source **26**, and/or the second conductor **36**B may be connected to the first bus bar **50**A and the positive terminal **26**A of the power source **26**. Current may flow from the positive terminal **26**A to the first bus bar **50**A to the second conductor **36**B, through the third diode $\mathbf{82}_3$ and to the first terminal **22**A of the support assembly **22**. In the second orientation, the first diode $\mathbf{82}_1$ and/or the fourth diode $\mathbf{82}_4$ may block current from flowing from the positive terminal **26**A to the second terminal **22**B of the support assembly **22**. In the second orientation, current may flow from the second terminal **22**B of the support assembly **22** through the second diode $\mathbf{82}_2$ to the first conductor **36**A, the second bus bar **50**B, and/or the negative terminal **26**B of the power source **26**.

With embodiments, such as generally illustrated in FIGS. **7**A and **7**B, a control circuit **52** may include a switch assembly **90**. The switch assembly **90** may be configured to connect the power source **26** to the support assembly **22** with the correct polarity regardless of the orientation of the support assembly **22**. For example and without limitation, the switch assembly **90** may be configured to connect the correct terminals **26**A, **26**B of the power source **26** to the appropriate support assembly terminals **22**A, **22**B (e.g., such that the first terminal **22**A of the support assembly **22** is connected to the first terminal **26**A of the power source **26** and the second terminal **22**B is connected to the second terminal **26**B of the power source **26**, regardless of the orientation of the support assembly **22**).

With embodiments, switches of the switch assembly **90** may include one or more of a variety of configurations. The switch assembly **90** may include switches (e.g., the switch assembly **90** may or may not include electromechanical components such as electromechanical relays). For example and without limitation, the switch assembly **90** may include a first switch $\mathbf{92}_1$, a second switch $\mathbf{92}_2$, a third switch $\mathbf{92}_3$, and/or a fourth switch $\mathbf{92}_4$ that may include silicon-based switches, transistors, and/or metal-oxide field effect transistors (MOSFETs), among other configurations. The first switch $\mathbf{92}_1$ may be connected to a first driver $\mathbf{94}_1$, the second switch $\mathbf{92}_2$ may be connected to a second driver $\mathbf{94}_2$, the third switch $\mathbf{92}_3$ may be connected to a third driver $\mathbf{94}_3$, and/or the fourth switch $\mathbf{92}_4$ may be connected to a fourth driver $\mathbf{94}_4$. The first switch $\mathbf{92}_1$, the second switch $\mathbf{92}_2$, the third switch $\mathbf{92}_3$, and the fourth switch $\mathbf{92}_4$ may be connected as a bridge circuit. The drivers $\mathbf{94}_1$, $\mathbf{94}_2$, $\mathbf{94}_3$, $\mathbf{94}_4$ may be configured to activate the switches $\mathbf{92}_1$, $\mathbf{92}_2$, $\mathbf{92}_3$, $\mathbf{92}_4$, respectively. The drivers $\mathbf{94}_1$, $\mathbf{94}_2$, $\mathbf{94}_3$, $\mathbf{94}_4$ may not carry power, but may set the gate voltage of the switches $\mathbf{92}_1$, $\mathbf{92}_2$, $\mathbf{92}_3$, $\mathbf{92}_4$ such that the switches $\mathbf{92}_1$, $\mathbf{92}_2$, $\mathbf{92}_3$, $\mathbf{92}_4$ may selectively open. The first conductor **36**A may be connected between the first switch $\mathbf{92}_1$ and the second switch $\mathbf{90}_2$. The second conductor **36**B may be connected between the third switch $\mathbf{92}_3$ and the fourth switch $\mathbf{92}_4$. The switch assembly **90** may include and/or be connected to one or more other passive electrical components (e.g., additional switches, one or more diodes, etc.).

In embodiments, such as generally illustrated in FIG. **7**A, if the support assembly **22** is in a first/forward orientation, the first conductor **36**A may be connected to the first bus bar **50**A and the positive terminal **26**A of the power source **26** and/or the second conductor **36**B may be connected to the second bus bar **50**B and the negative terminal **26**B of the

power source **26**. Current may flow from the positive terminal **26**A to the first bus bar **50**A, to the first conductor **36**A, and to the first switch $\mathbf{92}_1$ and the first driver $\mathbf{94}_1$. The first driver $\mathbf{94}_1$ may activate the first switch $\mathbf{92}_1$ to allow current to flow to the first terminal **22**A of the support assembly **22**. In the first orientation, the second switch $\mathbf{92}_2$ and/or the third switch $\mathbf{92}_3$ may not be activated and may block current from flowing from the positive terminal **26**A to the second terminal **22**B of the support assembly **22**. In the first orientation, current may flow from the second terminal **22**B of the support assembly **22** to the fourth switch $\mathbf{92}_4$ and the fourth driver $\mathbf{94}_4$. The fourth driver $\mathbf{94}_4$ may activate the fourth switch $\mathbf{92}_4$ to allow current to flow from the fourth switch $\mathbf{92}_4$ to the negative terminal **26**B of the power source **26**.

In embodiments, such as generally illustrated in FIG. **7**B, if the support assembly **22** is in a second/rearward orientation, the first conductor **36**A may be connected to the second bus bar **50**B and the negative terminal **26**B of the power source **26**, and/or the second conductor **36**B may be connected to the first bus bar **50**A and the positive terminal **26**A of the power source **26**. Current may flow from the positive terminal **26**A to the first bus bar **50**A, to the second conductor **36**B, and to the third switch $\mathbf{92}_3$ and the third driver $\mathbf{94}_3$. The third driver $\mathbf{94}_3$ may activate the third switch $\mathbf{92}_3$ to allow current to flow to the first terminal **22**A of the support assembly **22**. In the second orientation, the first switch $\mathbf{92}_1$ and/or the fourth switch $\mathbf{92}_4$ may not be activated and may block current from flowing from the positive terminal **26**A to the second terminal **22**B of the support assembly **22**. In the second orientation, current may flow from the second terminal **22**B of the support assembly **22** to the second switch $\mathbf{92}_2$ and the second driver $\mathbf{94}_2$. The second driver $\mathbf{94}_2$ may activate the second switch $\mathbf{92}_2$ to allow current to flow to the first conductor **36**A, the second bus bar **50**B, and/or the negative terminal **26**B of the power source **26**.

With embodiments, switches and drivers of a switch assembly **90** (e.g., switches $\mathbf{92}_1$, $\mathbf{92}_2$, $\mathbf{92}_3$, $\mathbf{92}_4$ and drivers $\mathbf{94}_1$, $\mathbf{94}_2$, $\mathbf{94}_3$, $\mathbf{94}_4$) may be configured for automatic activation (e.g., independent of any separate controllers, such as the ECUs **28**A, **28**B). If the correct polarity is provided to a switch and a driver, the driver may automatically activate the switch. If the reverse polarity is provided to the switch and the driver, the driver may not activate the switch. The switches $\mathbf{92}_1$, $\mathbf{92}_2$, $\mathbf{92}_3$, $\mathbf{92}_4$ may, for example and without limitation, be connected in a bridge configuration.

In embodiments, a control circuit **52**, a diode assembly **80**, and/or a switch assembly **90** may include at least four electrical components (e.g., non-electromechanical components) configured to connect the correct terminals **26**A, **26**B of the power source **26** to the appropriate support assembly terminals **22**A, **22**B regardless of the orientation of the support assembly **22**.

With embodiments, such as generally illustrated in FIGS. **7**C and **7**D, the first driver $\mathbf{94}_1$, the second driver $\mathbf{94}_2$, the third driver $\mathbf{94}_3$, and the fourth driver $\mathbf{94}_4$ may be combined into any number of drivers to control the switches $\mathbf{92}_1$, $\mathbf{92}_2$, $\mathbf{92}_3$, $\mathbf{92}_4$ (see, e.g., FIG. **7**C for two drivers and see FIG. **7**D for one driver). For example and without limitation, the first driver $\mathbf{94}_1$, the second driver $\mathbf{94}_2$, the third driver $\mathbf{94}_3$, and the fourth driver $\mathbf{94}_4$ may be combined into a first driver $\mathbf{96}_1$ and a second driver $\mathbf{96}_2$ (see, e.g., FIG. **7**C). The first driver $\mathbf{96}_1$ may be connected to the first switch $\mathbf{92}_1$ and the second switch $\mathbf{92}_2$. The second driver $\mathbf{96}_2$ may be connected to the third switch $\mathbf{92}_3$ and the fourth switch $\mathbf{92}_4$. The first driver $\mathbf{96}_1$ may be configured to control/activate the first switch $\mathbf{92}_1$ and the second switch $\mathbf{92}_2$. The second driver $\mathbf{96}_2$ may be configured to control/activate the third switch $\mathbf{92}_3$ and the fourth switch $\mathbf{92}_4$. In embodiments, the control circuit **52**, may include a single driver **98** that may be configured to control/activate the first switch $\mathbf{92}_1$, the second switch $\mathbf{92}_2$, the third switch $\mathbf{92}_3$, and the fourth switch $\mathbf{92}_4$ (see, e.g., FIG. **7**D). The driver **98** may be connected to each of the switches $\mathbf{92}_1$, $\mathbf{92}_2$, $\mathbf{92}_3$, $\mathbf{92}_4$.

Embodiments of control circuits **52**, such as the five embodiments illustrated in FIGS. **3**A-**3**C, **4**A and **4**B, **5**A and **5**C, **6**A and **6**B, and **7**A-**7**D, may include various advantages and/or potential drawbacks. The embodiment of FIGS. **3**A-**3**C may, for example and without limitation, include a compact configuration, may involve medium cost, and may involve a relatively low voltage drop, but may experience reduced relay life cycle (e.g., each maneuver of the support assembly **22** may actuate a relay) and/or may involve increased noise from the relays **62**, **64**. The embodiment of FIGS. **4**A and **4**B may, for example and without limitation, involve low cost, a relatively low voltage drop, a relative long relay life cycle/minimal relay noise (e.g., relays may only be actuated when a support assembly **22** is disposed in a second orientation), but may experience a reverse pulse from the power source **26** during an initial connection of the support member **30** with the track assembly **38**. The embodiment of FIGS. **5**A and **5**B may, for example and without limitation, not involve a reverse pulse from the power source **26**, but may involve a higher cost, a higher voltage drop, and/or may experience a shorter life cycle for the third relay **76** which may actuate for each maneuver of the support assembly **22**. The embodiment of FIGS. **6**A and **6**B may, for example and without limitation, involve high cost, a relatively high voltage drop, a relatively long diode life (e.g., longer than the expected life of a vehicle), a no-noise and compact control circuit **52**. The embodiment of FIGS. **7**A-**7**D may, for example and without limitation, involve a high cost, a relatively low voltage drop, minimum power waste, a longer circuit life (e.g., longer than the expected life of a vehicle), low or substantially no noise, and/or a compact control circuit **52**.

In embodiments, an electrical assembly **20** may be configured to avoid a reverse polarity conduction, provide power to the support assembly **22** in the second/rearward-facing configuration, and/or provide digital monitoring of the position of the support assembly **22**.

With embodiments, a control circuit **52** may operate automatically, such as independently of the ECUs **28**A, **28**B. For example and without limitation, a control circuit **52** (e.g., a relay assembly) **60** may switch between states (e.g., a first state, a second state, and/or a third state) without being controlled by an ECU **28**A, **28**B. One or both of the ECUs **28**A, **28**B may be connected to the control circuit **52** and the connection may be a passive/monitoring connection. A control circuit **52** may be configured as a passive assembly and may not involve a capacitor or internal energy storage.

In embodiments, a controller may include an electronic controller and/or include an electronic processor, such as a programmable microprocessor and/or microcontroller. In embodiments, a controller may include, for example, an application specific integrated circuit (ASIC). A controller may include a central processing unit (CPU), a memory (e.g., a non-transitory computer-readable storage medium), and/or an input/output (I/O) interface. A controller may be configured to perform various functions, including those described in greater detail herein, with appropriate programming instructions and/or code embodied in software, hardware, and/or other medium. In embodiments, a controller

may include a plurality of controllers. In embodiments, a controller may be connected to a display, such as a touch-screen display.

Various embodiments are described herein for various apparatuses, systems, and/or methods. Numerous specific details are set forth to provide a thorough understanding of the overall structure, function, manufacture, and use of the embodiments as described in the specification and illustrated in the accompanying drawings. It will be understood by those skilled in the art, however, that the embodiments may be practiced without such specific details. In other instances, well-known operations, components, and elements have not been described in detail so as not to obscure the embodiments described in the specification. Those of ordinary skill in the art will understand that the embodiments described and illustrated herein are non-limiting examples, and thus it can be appreciated that the specific structural and functional details disclosed herein may be representative and do not necessarily limit the scope of the embodiments.

Reference throughout the specification to "various embodiments," "with embodiments," "in embodiments," or "an embodiment," or the like, means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. Thus, appearances of the phrases "in various embodiments," "with embodiments," "in embodiments," or "an embodiment," or the like, in places throughout the specification are not necessarily all referring to the same embodiment. Furthermore, the particular features, structures, or characteristics may be combined in any suitable manner in one or more embodiments. Thus, the particular features, structures, or characteristics illustrated or described in connection with one embodiment/example may be combined, in whole or in part, with the features, structures, functions, and/or characteristics of one or more other embodiments/examples without limitation given that such combination is not illogical or non-functional. Moreover, many modifications may be made to adapt a particular situation or material to the teachings of the present disclosure without departing from the scope thereof.

It should be understood that references to a single element are not necessarily so limited and may include one or more of such element. Any directional references (e.g., plus, minus, upper, lower, upward, downward, left, right, leftward, rightward, top, bottom, above, below, vertical, horizontal, clockwise, and counterclockwise) are only used for identification purposes to aid the reader's understanding of the present disclosure, and do not create limitations, particularly as to the position, orientation, or use of embodiments.

Joinder references (e.g., attached, coupled, connected, and the like) are to be construed broadly and may include intermediate members between a connection of elements and relative movement between elements. As such, joinder references do not necessarily imply that two elements are directly connected/coupled and in fixed relation to each other. The use of "e.g." in the specification is to be construed broadly and is used to provide non-limiting examples of embodiments of the disclosure, and the disclosure is not limited to such examples. Uses of "and" and "or" are to be construed broadly (e.g., to be treated as "and/or"). For example and without limitation, uses of "and" do not necessarily require all elements or features listed, and uses of "or" are intended to be inclusive unless such a construction would be illogical.

While processes, systems, and methods may be described herein in connection with one or more steps in a particular sequence, it should be understood that such methods may be practiced with the steps in a different order, with certain steps performed simultaneously, with additional steps, and/or with certain described steps omitted.

It is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative only and not limiting. Changes in detail or structure may be made without departing from the present disclosure.

It should be understood that a controller (e.g., controller), a system, and/or a processor as described herein may include a conventional processing apparatus known in the art, which may be capable of executing preprogrammed instructions stored in an associated memory, all performing in accordance with the functionality described herein. To the extent that the methods described herein are embodied in software, the resulting software can be stored in an associated memory and can also constitute means for performing such methods. Such a system or processor may further be of the type having both ROM, RAM, a combination of non-volatile and volatile memory so that any software may be stored and yet allow storage and processing of dynamically produced data and/or signals.

It should be further understood that an article of manufacture in accordance with this disclosure may include a non-transitory computer-readable storage medium having a computer program encoded thereon for implementing logic and other functionality described herein. The computer program may include code to perform one or more of the methods disclosed herein. Such embodiments may be configured to execute one or more processors, multiple processors that are integrated into a single system or are distributed over and connected together through a communications network, and/or where the network may be wired or wireless. Code for implementing one or more of the features described in connection with one or more embodiments may, when executed by a processor, cause a plurality of transistors to change from a first state to a second state. A specific pattern of change (e.g., which transistors change state and which transistors do not), may be dictated, at least partially, by the logic and/or code.

What is claimed is:

1. An electrical assembly, including:

a track assembly, including:

a first track having a first bus bar, the first bus bar configured for connection with a first terminal of a power source, and

a second track having a second bus bar, the second bus bar configured for connection with a second terminal of said power source;

a control circuit including a first relay, a second relay, and a diode; and

a support assembly configured for connection with the track assembly in a first orientation and in a second orientation, the support assembly including:

a positive terminal; and

a negative terminal;

wherein the control circuit is configured to automatically connect the first bus bar to the positive terminal of the support assembly and connect the second bus bar to the negative terminal of the support assembly regardless of whether the support assembly is connected to the track assembly in the first orientation or the second orientation.

2. The electrical assembly of claim **1**, wherein the control circuit includes a second diode.

3. The electrical assembly of claim 1, wherein a first coil of the first relay and a second coil of the second relay are configured to be energized when electrically connected to the first bus bar.

4. The electrical assembly of claim 1, wherein if the support assembly is connected to the track assembly in the first orientation, the diode is configured to permit current to flow to energize a first coil of the first relay.

5. The electrical assembly of claim 4, wherein if the support assembly is connected to the track assembly in the second orientation, a second diode is configured to permit current to flow to energize a second coil of the second relay.

6. The electrical assembly of claim 1 wherein the control circuit is configured such that only one of a first coil of the first relay and a second coil of the second relay are energized at a time.

7. The electrical assembly of claim 1, wherein the support assembly includes a support member; the support member includes a conductor and an additional conductor; if the support assembly is in the first orientation, the conductor is configured to connect to the first bus bar and the additional conductor is configured to connect to the second bus bar; and, if the support assembly is in the second orientation, the conductor is configured to connect to the second bus bar and the additional conductor is configured to connect to the first bus bar.

8. The electrical assembly of claim 7, wherein if the support assembly is in the first orientation, the first bus bar is connected to the conductor and the control circuit is configured to connect the conductor to the positive terminal of the support assembly.

9. The electrical assembly of claim 8, wherein if the support assembly is in the second orientation, the first bus bar is connected to the additional conductor; and the control circuit is configured to connect the additional conductor to the positive terminal of the support assembly.

10. The electrical assembly of claim 1, wherein the support assembly includes the control circuit and the support assembly is configured for removal from the track assembly in a vertical direction substantially perpendicular to a longitudinal direction of the track assembly.

11. The electrical assembly of claim [[10]] 1, wherein the first relay includes a first coil; the second relay includes a second coil; and the diode is configured control current flow into the first coil and the second coil.

12. The electrical assembly of claim 11, wherein if the support assembly is in the first orientation, the first coil and the second coil are not energized, the first bus bar is connected to the positive terminal of the support assembly, and the second bus bar is connected to the negative terminal of the support assembly; and, if the support assembly is in the second orientation, the first coil and the second coil are energized, the first bus bar is connected to the positive terminal of the support assembly, and the second bus bar is connected to the negative terminal of the support assembly.

13. The electrical assembly of claim 1, An electrical assembly, including:

a track assembly, including:

a first track having a first bus bar, the first bus bar configured for connection with a first terminal of a power source, and

a second track having a second bus bar, the second bus bar configured for connection with a second terminal of said power source;

a control circuit and a support assembly configured for connection with the track assembly in a first orientation and in a second orientation, the support assembly including:

a positive terminal; and

a negative terminal;

wherein the control circuit includes at least four non-electromechanical electrical components including transistors and/or diodes; and

wherein the control circuit is configured to automatically connect the first bus bar to the positive terminal of the support assembly and connect the second bus bar to the negative terminal of the support assembly regardless of whether the support assembly is connected to the track assembly in the first orientation or the second orientation.

14. The electrical assembly of claim 1, wherein the control circuit includes a third relay and a second diode; the first relay includes a first coil; the second relay includes a second coil; the diode is connected to the first coil and the second coil; the third relay includes a third coil; and the second diode is connected to the third coil and the first relay.

15. The electrical assembly of claim 14, wherein the third coil is energized if the support assembly is in either of the first orientation or the second orientation.

16. The electrical assembly of claim 14, wherein if the support assembly is in the first orientation, the first coil and the second coil are not energized; and if the support assembly is in the second orientation, the first coil and the second coil are energized.

17. The electrical assembly of claim 14, wherein the third relay is configured to compensate for a reverse pulse from said power source.

18. The electrical assembly of claim 14, wherein the diode is configured to permit current flow from first conductor to the first coil and the second coil when the support assembly is in the second orientation; and the diode is configured to restrict current flow through the first coil and the second coil when the support assembly is in the first orientation.

19. The electrical assembly of claim 13, wherein the at least four non-electromechanical electrical components include diodes, including a first diode, a second diode, a third diode, and a fourth diode;

the first diode, the second diode, the third diode, and the fourth diode are connected in a bridge circuit configuration;

the positive terminal is connected to the first diode and the third diode; the negative terminal is connected to the second diode and the fourth diode;

a first conductor of the support assembly is connected between the first diode and the second diode; and

a second conductor of the support assembly is connected between the third diode and the fourth diode.

20. An electrical assembly, including:

a track assembly, including:

a first track having a first bus bar, the first bus bar configured for connection with a first terminal of a power source, and

a second track having a second bus bar, the second bus bar configured for connection with a second terminal of said power source;

a control circuit and

a support assembly configured for connection with the track assembly in a first orientation and in a second orientation, the support assembly including:

a positive terminal; and

a negative terminal;

wherein the control circuit includes a switch assembly including a plurality of switches and at least one driver to automatically activate the plurality of switches; and

wherein the control circuit is configured to automatically connect the first bus bar to the positive terminal of the support assembly and connect the second bus bar to the negative terminal of the support assembly regardless of whether the support assembly is connected to the track assembly in the first orientation or the second orientation.

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